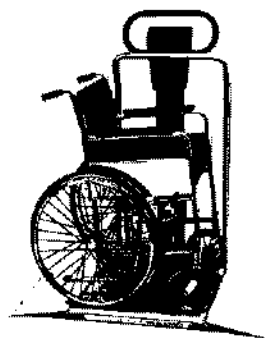
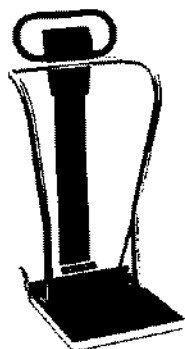


# SCALE-TRONIX<sup>®</sup>

## SECOND GENERATION WEIGHING SYSTEMS

5002 PORTABLE STAND ON SCALE  
5102 PHYSICIAN'S OFFICE SCALE  
5602 PORTABLE SURVEY SCALE  
6002 PORTABLE WHEELCHAIR SCALE  
6702 EXTRA WIDE WHEELCHAIR SCALE  
6102 BUILT IN FLOOR SCALE  
6202 RAMP SCALE  
6502 CHAIR SCALE

## OPERATING AND SERVICE MANUAL



## **SPECIFICATIONS:**

**5002 - PORTABLE STAND-ON SCALE**  
**5602 - PORTABLE SURVEY SCALE**  
**6102 - BUILT IN FLOOR SCALE**  
**6502 - PORTABLE CHAIR SCALE**

**5102 - PHYSICIAN'S OFFICE SCALE**  
**6002 - PORTABLE WHEELCHAIR SCALE**  
**6202 - RAMP SCALE**  
**6702 - PORTABLE EXTRA WIDE WHEELCHAIR SCALE**

### **GENERAL**

Complete line of heavy-duty, high-performance weighing systems. Computer-controlled digital readout and electronic weighing platforms provide the ultimate in weighing systems for use by hospitals, nursing homes, physician's offices, research laboratories, etc.

All scales employ user friendly controls and an easy to follow operating procedure. Scales employ resistive strain gauge transducer technology and have no moving parts to service.

Models 5002, 6002, 6502, and 6702 are equipped with large rubber tires for easy, silent running.

### **WEIGHING CAPACITY**

5002 - 0-880 LB. (400 KG.)  
5102 - 0-880 LB. (400 KG.)  
5602 - 0-440 LB. (200 KG.)  
6002 - 0-880 LB. (400 KG.)  
6102 - 0-825 LB. (375 KG.)  
6202 - 0-880 LB. (400 KG.)  
6502 - 0-400 LB. (180 KG.)  
6702 - 0-880 LB. (400 KG.)

### **ACCURACY**

Standard weight change accuracy and resolution on most models is 0.1 pound / 0.1 kilogram (100 grams). Some scales are provided with 1 pound (or other) resolution depending on the application. Enhanced accuracy options are available on some models.

### **WEIGHT DISPLAY**

Large, bright, light emitting diode (LED) display. Easily read in any lighting conditions. Weight displayed in either Pounds or Kilograms.

Previous patient's weight held in memory. Weight can be recalled after patient leaves scale.

### **POWER SUPPLY**

#### **PORTABLE SCALES:**

Disposable "D" size alkaline batteries.  
(model 5602 employs "C" size batteries).

#### **LINE POWERED SCALES:**

100-120 VAC 50/60 Hz.  
200-240 VAC 50/60 Hz. (Optional)

**Note:** Portable scales can be supplied with line power supply/rechargeable battery on special order.

### **OPTIONS**

Paper tape printer available on 5002, 6002, 6102, 6502, and 6702.

Sturdy handrail available on 5002, 6002, and 6702 for patient assistance.

Height gauge available on 5002, 6002, and 6702.

Line power option with or without rechargeable battery available for models 5002, 6002, 6502, and 6702.

### **DATA OUTPUT**

Optional RS-232 data port (most models).

### **DIMENSIONS**

See specific section for each scale.

### **WARRANTY**

One (1) year, all parts and labor

### **FACTORY AND SERVICE**

P. O. Box 15, Wheaton, IL 60189  
(630) 653-3377

### **MARKETING AND SALES**

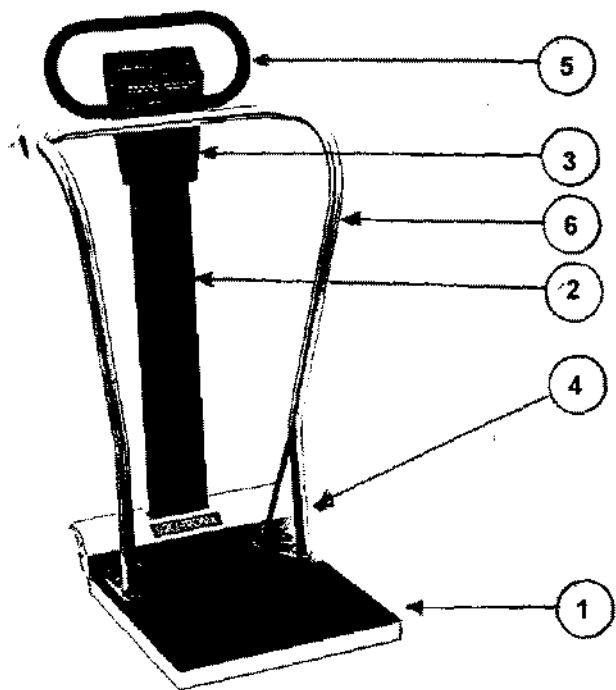
200 E. Post Rd., White Plains, NY 10601  
(914) 948-8117

# PATIENT WEIGHING SYSTEMS

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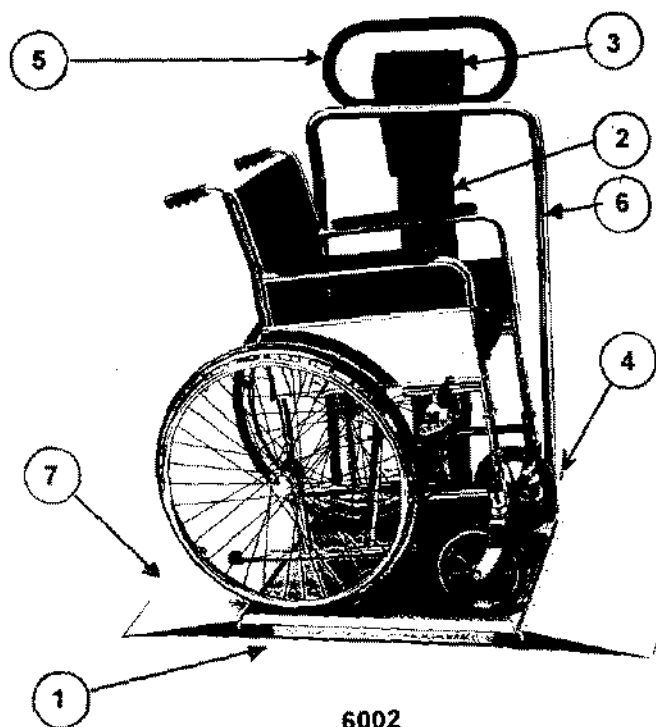
This User's manual is intended to provide all necessary information and data for the proper operation and service of the **SECOND GENERATION PATIENT WEIGHING SYSTEMS** manufactured by **SCALE-TRONIX®, INC.** This manual should be studied before installing or placing the scale in service. Please store in a safe, handy place for future reference. Additional manuals are available from **SCALE-TRONIX®, INC.** at a nominal charge. Refer to the scale serial and model numbers in any and all correspondence.

Feel free to call the factory for service and operational assistance - **630-653-3377.**



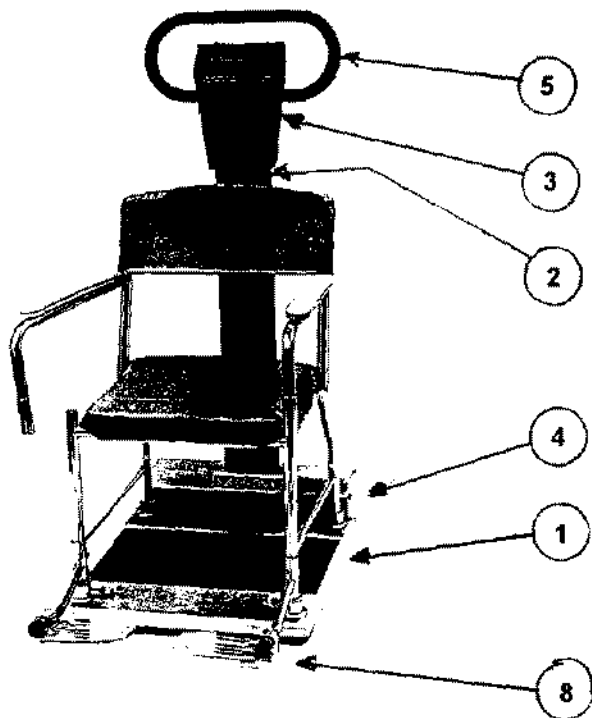
**5002**

**STAND-ON SCALE**



**6002**

**WHEELCHAIR SCALE**



**6502**

**CHAIR SCALE**

### **PARTS LIST**

1. Weighing platform
2. Mast
3. Readout
4. Wheels
5. Steering handle and hand grip
6. Handrail (optional)
7. Flaps for wheelchair
8. Foot rests

# GENERAL DESCRIPTION

## 1.00 GENERAL

**Congratulations!** You have just purchased a **SECOND GENERATION WEIGHING SYSTEM** from **SCALE-TRONIX®**. These scales are derived from earlier first-generation **SCALE-TRONIX®** weighing scales and contain many improvements and numerous new features. The digital readouts contain the latest microcomputer control system combined with user friendly, robust software and DSP (digital signal processing) to provide you with feature-rich, easy-to-use scales for all applications. Many of the scale's functional parameters can be customized by the operator to suit specific needs and requirements.

Previously employed rechargeable batteries have been replaced with disposable batteries. Typical battery life is greater than one year under normal conditions. Finally - a truly cordless, portable weighing system!

As regards non-portable scales, the power supply is available for 100-120 VAC operation or can be specially ordered for use on 200-240 VAC.

Audible response by a series of beeps provides excellent operator feedback for ease of operation. (This audio beeper can be switched off by the operator for use in "low-stimulus" environments.) A shielded metal readout enclosure is provided for interference-free operation. Some models provide an option for serial data output to a computer, data collection system, internal or external printer.

The scales described in this manual operate in a very similar manner to each other. Different scale configurations and weighing platforms are provided for each unique and specific application.

**SUCCESSIVE WEIGHING:** An exclusive feature with **SCALE-TRONIX®**. These scales will weigh multiple patients without the operator having to "zero" or restart the scale in-between patients. The scale will stay on as long as required. DSP (Digital Signal Processing) and the scale's internal microcomputer software know when successive weighing is taking place and will keep the scale turned on. Shortly after the last patient is weighed

the scale shuts itself off automatically to conserve batteries. The shut-off time delay is selectable and field programmable. The time delay to turn off can be easily changed to suit unique requirements.

**RECALL:** The weight of the patient is stored in memory and can be recalled by a touch of a button. Thus the problem of forgetting the patient's weight has been solved. The recalled weight can be displayed in either pounds or kilograms.

**REWEIGH:** A press of the button allows reweighing while the patient is still on the scale; there is no need to remove the patient from the weighing platform and start over.

**PRINTER:** An optional paper tape printer is available on most models of scales to provide a printed record of the patient's weight. This printer mounts to the back-side of the digital readout on some models (5002, 6002, 6502, 6702), or is built directly into the readout cabinet (models 6102 and 6202).

**DATA OUTPUT:** RS-232 serial data output to a computer, data collection system, or external printer is available on most models as an option. Consult the factory for further details.

## 1.10 5002 PORTABLE STAND-ON SCALE

The **5002** provides an increased weighing capacity of 880 pounds (400 Kilograms) and a larger patient weighing platform (18 x 19.5 inches vs 14 x 18) than its predecessor, the **SCALE-TRONIX®** model **5005** first generation stand-on scale. The sequence of operation has been improved also. Just step on the scale and wait for the three beeps signaling accurate weight acquisition. The computer controlled readout provides the simple operating sequence and renders many new features, including automatic zero, memory for prior weight recall, printer or data output (RS-232) capability, etc. The platform is stable, and sits low to the floor for easy patient access. The handrail has been redesigned to provide greater support. It has a sloped design to improve comfort for short and tall patients,

including children. Greater toe clearance has been provided making it easier to get on and off from the side without interference. Large rubber tires provide easy, quiet movement of the scale. The use of disposable batteries has eliminated the need for a power cord. Batteries are easily changed without the use of special tools. Exposed cables and connectors have been eliminated.

#### **1.20 5102 PHYSICIAN'S OFFICE SCALE**

A simple-to-use platform scale that is intended to be utilized in one location. The 14 x 18 inch platform is placed on the floor, while the stainless steel digital readout mounts on the wall and plugs into an electrical outlet. (Battery powered models available on special order). This model operates in a similar fashion to the **5002** except that it is designed to remain powered on at all times. Just step on the scale and wait for the three beeps signaling accurate weight acquisition.

#### **1.30 5602 PORTABLE SURVEY SCALE**

A rugged, simple-to-use portable scale designed for field survey, visiting nurse home care, and other requirements where a durable scale must be easily transportable. The scale is comprised of two main components: a weighing platform and digital readout, both of which employ carrying handles. Weighing capacity is 440 pounds (200 Kilograms). The compact platform is adequate for most requirements, yet small enough for convenient travel and storage.

#### **1.40 6002 WHEELCHAIR SCALE**

A second generation improvement to the legendary model **6006** Wheelchair Scale, this scale contains many of the same improvements as described in the model **5002** above. The weighing capacity has been increased to 880 pounds (400 Kilograms). In order to simplify operation and provide many new features, the scale's readout has been improved with the incorporation of a microcomputer. By incorporating long-lasting disposable batteries and eliminating the power cord it is now a truly cordless scale. The 24 x 26 inch platform accommodates most wheelchairs in use today. (For larger chairs, see the model **6702** or model **6202** scale). Large rubber tires are provided for quiet,

easy movement. Exposed cables and connectors have been eliminated.

The model **6002** also serves as an excellent stand-on scale when the ramps are folded up. In addition, a chair can be placed on the platform to serve as a chair scale when the need arises. The weight of the chair is removed by simply pressing the zero pushbutton prior to the patient being seated. Thus the scale is really three scales in one. The weighing sequence is similar to the model **5002**.

#### **1.50 6702 EXTRA-WIDE WHEELCHAIR SCALE**

Same features as the **6002** above, with the exception of a larger weighing platform (28 x 28 inches) to accommodate extra-large wheelchairs, electric wheelchairs, and certain geriatric chairs.

Standard wheelchairs and standing patients are also easily accommodated.

#### **1.60 6102 BUILT-IN FLOOR SCALE**

Built-in scales provide the ultimate in functionality and performance. Large platforms allow the use of wheelchair, fixed chair, or standing patient applications. The platforms are flush with the floor and can even be covered with matching tile, carpet, etc. Patients with walkers or crutches can use this scale easily, as can wheelchair-bound patients. It can also weigh utility carts. A variety of platform sizes are available, the standard being 32" x 36". Dual platform models are available for weighing beds, stretchers, etc. Since the platform is flush-mounted with the floor, the need for ramps is eliminated, making it much easier to roll a wheelchair or cart onto the scale.

Installation of the weighing platform requires a recess in the floor. Consult **SCALE-TRONIX®** for architectural and installation details.

The scale's digital readout is AC line powered and remains on continuously. The readout is available in both 100-120 and 200-240 VAC models. A rechargeable battery pack is incorporated within the readout to provide operation during power interruptions. The readout is provided in two basic configurations:

a.) A totally flush-mounted unit that mounts into a cut-out in the wall. This is designed to be directly connected into the building's electrical supply and scale platform by use of rigid or flexible conduit.

b.) A surface-mounted unit that is secured to the face of the wall. Electrical power is provided by a standard line-cord. Connection from the platform is by means of a detachable cable.

Either style readout can incorporate an optional built-in paper ticket printer which provides a printed copy of the patient's weight, along with spaces for the patient's name, room number, time and date. The printer incorporates a thermal mechanism which is very quiet in operation and does not require the use of ink ribbons or cartridges. The printer can be set to print automatically when the patient's weight is obtained.

#### **1.70 6202 RAMP SCALE**

The **6202** ramp scale provides a solution for semi-portable weighing of stretchers, beds, laundry carts, wheelchairs, etc. The scale is typically left in one place, but can easily be moved when required. The weighing operations and sequence are the same as the model **6002/6702** wheelchair scales.

#### **1.80 6502 CHAIR SCALE**

A portable scale with a chair attached. The chair features swing away armrests and a low profile for ease in seating patients. A built-in foot rest for accurate weighing is included. Simply slide it out when in use. Weight capacity is 400 pounds. Even though the chair is normally mounted to the scale, it can be removed for used as a stand-on scale. Large rubber tires are provided for easy, silent running.

# ASSEMBLY - SET UP

## 2.00 GENERAL

This section includes detailed assembly instructions for each scale. One combination operation/service manual is supplied with the scale. Additional manuals are available for a nominal charge. To insure proper and safe operation of your new scale please follow the assembly directions carefully.

**SCALE-TRONIX®** assembles all scales at the factory to insure proper fit and performance. In some instances the scales are shipped assembled; however due to size and shipping restrictions most scales are partially disassembled. If assembly is required, it can be easily accomplished with common hand tools. Where special tools are required they are supplied with the scale. Be sure to securely tighten all bolts and fasteners to insure a long life for your scale.

**Important Note:** The components of the scale have been carefully matched and calibrated at the factory to insure correct assembly and accurate function. In situations where multiple scales have been purchased, **DO NOT intermix the various readouts, masts, weighing platforms, etc.!** Doing so may cause errors in the scale's performance. Scales that have components shipped in multiple cartons have that scale's serial number written on each carton so that the various components (mast, weighing platform, etc.) can be placed together and assembled as a unit.

It is wise to save the carton and shipping materials for future use in case the scale needs to be returned to the factory for service or upgrades. Carefully inspect all cartons for shipping damage before unpacking. Contact the shipping company and **SCALE-TRONIX®** immediately if shipping damage is found. All claims must immediately be made directly with the shipper.

## 2.10 5002 STAND-ON SCALE

**NOTE:** In some cases the **5002** scale may be shipped in an assembled condition thus eliminating the need for assembly.

Carefully remove all parts from the shipping carton. Inspect the components for shipping damage. Place the scale base on a floor or work bench. The interior cable that connects the readout to the weighing platform will be tucked up inside the mast. Carefully pull the end with the connector out of the bottom of the mast. Insert the mast into the base with the readout facing the black weighing platform. Be sure the interior cable is routed properly and not pinched by the mast.

Fasten the mast with the bolts and washers provided. It is important to tighten the bolts securely to insure a stable and solid connection.

Align the plastic connector of the interior cable with its mate, located on the base near the bottom of the mast. The connector will only mate one way. If it does not go together turn it over and try again. Press it together firmly for a good connection. Be sure to tuck any slack cable inside the mast so it will not drag on the floor.

## 2.11 HANDRAIL

If you ordered the handrail with the scale install it now by attaching it to the top of the weighing platform. Attach the handrail using the 1/4-20 x 5/8" button head screws and the hex Allen wrench provided. Three (3) screws are required for each mounting plate (6 total). Clearance holes have been provided in the black plastic cover. Tighten all 6 screws securely to insure a safe and stable handrail for your patient.

If you did not order the handrail at the time of the scale's purchase it can be added at a later date as described below. The handrail is a useful addition to the scale and helps to provide accurate and safe operation. The handrail can be readily ordered through **SCALE-TRONIX®**.

**Note:** Early versions of the scale did not provide clearance holes for the handrail mounting. Before installing the handrail, remove the plastic cover by lifting it up and off the aluminum plate. Turn the plastic cover over and note that the locations for the six (6) holes have already been located and marked. Simply drill or cut-out clearance holes in the indicated locations. The



holes can be 5/16 or 3/8 inch diameter. Replace the plastic cover and install the handrail as described above.)

## **2.12 HEIGHT GAUGE ASSEMBLY**

If your scale was ordered with a height gauge follow the installation directions packed with the height gauge.

## **2.20 5102 PHYSICIAN'S OFFICE SCALE**

Carefully remove all parts from the shipping carton. Inspect all components for shipping damage. The only assembly required for this scale is to mount the flat pack readout to a wall at a convenient reading height. Preferably pick a location near an electrical receptacle. Detach the mounting bracket from the readout by removing the two top screws on both sides of the readout. A 1/8" Allen hex wrench is supplied for this purpose. The method of fastening will vary according to the type of wall. Mount the bracket to the wall with appropriate mounting hardware such as dry-wall fasteners, "molly-bolts", screws, etc. (not included with scale). Reassemble the readout to the bracket by re-installing the two previously removed screws.

Place the platform on the floor in the desired position. **NOTE:** The platform should be six to ten inches away from the wall for proper operation (so the patient's body will not touch the wall). Connect the transducer cable between the platform and the readout. Insert the power cord's plug into an electrical outlet.

Handrails are not available for this scale.

## **2.30 5602 PORTABLE SURVEY SCALE**

Carefully remove all parts from the shipping carton. Inspect all components for shipping damage.

This scale is shipped fully-assembled from the factory. Simply connect the transducer cable between the platform and readout. For proper use, the platform should be placed on the floor, and the readout can be held or placed on a table.

Handrails are not available for this scale.

## **2.40 6002 WHEELCHAIR SCALE**

**NOTE:** In some cases the 6002 scale may be shipped in an assembled condition thus eliminating the need for assembly.

Carefully remove all parts from the shipping carton. Inspect the components for shipping damage. Place the scale base on a floor or work bench. The interior cable that connects the readout to the weighing platform will be tucked up inside the mast. Carefully pull the end with the connector out of the bottom of the mast. Insert the mast into the base with the readout facing the black weighing platform. Be sure the interior cable is routed properly and not pinched by the mast.

Fasten the mast with the bolts and washers provided. It is important to tighten the bolts securely to insure a stable and solid connection.

Align the plastic connector of the interior cable with its mate, located on the base near the bottom of the mast. The connector will only mate one way. If it does not go together turn it over and try again. Press it together firmly for a good connection. Be sure to tuck any slack cable inside the mast so it will not drag on the floor.

## **2.41 WEIGHING DECK MOUNTING**

The weighing deck is mounted to the scale by four (4) special flat head screws. The deck must be positioned so that the two sets of holes (under the flaps) are closest to the mast. These holes are used for mounting the handrail. Line the weighing deck up with the mounting holes in the aluminum plate. Install four 1/4" flat head screws (supplied) through the deck. Tighten the mounting screws securely with the hex Allen wrench provided.

## **2.42 HANDRAIL**

If you have ordered the handrail for the scale install it now by fastening it to the weighing deck. The mounting feet of the 6002 handrail are attached to the **underside** of the weighing deck with the hardware provided. Each foot of the handrail attaches to the platform with the two flat head screws and special locking nuts provided. It is important to tighten the screws and nuts securely.

If you did not order the handrail at the time of the

scale's purchase it can be added at a later date. The handrail is a useful addition to the scale and helps to provide accurate and safe operation. The handrail can be readily ordered through **SCALE-TRONIX®**.

### **2.43 HEIGHT GAUGE ASSEMBLY**

If your scale was ordered with a height gauge follow the installation directions packed with it.

### **2.50 6702 EXTRA WIDE WHEELCHAIR SCALE**

The assembly of this scale uses the same procedure as the model **6002** above. The platform is larger than the **6002**. The same handrail is used with either scale.

### **2.60 6102 BUILT IN FLOOR SCALE**

Carefully remove all parts from the shipping carton. Inspect all components for shipping damage.

This scale is normally installed by **SCALE-TRONIX®** service personnel to insure proper assembly and operation. A pit in the floor should have been previously prepared according to the plans supplied by **SCALE-TRONIX®**. This pit can be formed when the floor is poured, or it can be cut into an existing floor. A "rough-in" frame, supplied with the model **6102**, is then cemented into the floor's pit.

Once the rough-in frame installation is complete, and the scale's readout is mounted (see installation instructions included with the readout), the weighing frame can be positioned into the rough-in frame. First remove the thread protectors from the (4) 5/16"-18 bolts which protrude up from the rough-in frame. Place the weighing frame into the rough-in frame, aligning it over the four (4) bolts. Fasten the weighing frame in place using the four (4) 5/16"-18 nuts provided and tighten securely.

(Note: Some models may employ a different installation technique for mounting the weighing platform to the rough-in frame. Follow any included instructions supplied with the rough-in frame and weighing platform.)

"Fish" the interconnecting transducer cable through the conduit from the readout down to the base (a "tracer"

string is normally "pre-loaded" within the flexible conduit for pulling the cable through the conduit). Connect the transducer cable to the terminal block in the weighing frame making sure to observe the correct color coding as noted on the label next to the terminal strip. On flush-mounted readouts attach the individual conductors of the cable to the readout's internal terminal block. Surface mounted readouts have a socket on the cabinet that mates with the pre-wired connector on the cable assembly.

A dual version of the model **6102** is also available which incorporates two weighing platforms. An additional flexible conduit is included to connect the two weighing platforms together. Follow the specific instructions included with the scale for interconnecting the platforms and the readout.

Re-attach the top deck to the weighing frame using the eight (8) 10-24 flat head Allen screws and the Allen hex wrench provided. Tighten securely. Place the optional gray plastic deck cover on top of the deck unless an alternate covering material is to be used. If a floor covering is to be affixed to the top deck make sure there is a 1/4" gap on all four sides to prevent binding and allow free movement of the weighing mechanism. This will insure accurate performance.

No handrails are available for this scale.

### **2.70 6202 RAMP SCALE**

Carefully remove all parts from the shipping carton. Inspect all components for shipping damage. Place the scale base assembly on the floor. Connect the transducer cable between the scale base and the readout. Insert the plug of the power cord into an electrical receptacle. The operation of the scale is similar to the **6002** and **6702** wheelchair scales.

No handrails are available for this scale.

### **2.80 6502 CHAIR SCALE**

**NOTE:** In some cases the **6502** scale may be shipped in an assembled condition thus eliminating the need for assembly.

Carefully remove all parts from the shipping

carton. Inspect the components for shipping damage. Place the scale base on a floor or work bench. The interior cable that connects the readout to the weighing platform will be tucked up inside the mast. Carefully pull the end with the connector out of the bottom of the mast. Insert the mast into the base with the readout facing the black weighing platform. Be sure the interior cable is routed properly and not pinched by the mast.

Fasten the mast with the bolts and washers provided. It is important to tighten the bolts securely to insure a stable and solid connection.

Align the plastic connector of the interior cable with its mate, located on the base near the bottom of the mast. The connector will only mate one way. If it does not go together turn it over and try again. Press it together firmly for a good connection. Be sure to tuck any slack cable inside the mast so it will not drag on the floor.

The chair is inserted into the mounting cups (chair facing away from readout) and secured by the four (4) wing bolts.

No handrails are available for this scale.

## **2.90 POWER SUPPLY / CHARGER / RECHARGEABLE BATTERY OPTION**

An option is available to provide AC line power operation for **SCALE-TRONIX®** models **5002 / 6002 / 6502 / 6702**. This module mounts in the rear of the readout cabinet, in place of the access panel. Note: Because the internal printer option also uses this mounting method, the power supply / (charger) / (rechargeable battery) is not available for those scales equipped with the internal printer.

Two versions are available: An AC power supply only, which eliminates the use of disposable dry cells; and a power supply / charger with rechargeable nickel-cadmium battery pack, which allows corded or cordless operation. Normally supplied for operation at 120 VAC, 240 VAC operation is also available.

Both versions are available as either a factory installed option at the time of scale purchase, or as a "field add-on" modification kit that can be installed by the customer with minimum effort. Refer to the instructions included with the power supply when installing it.

Call the factory (see inside front cover) for availability, pricing, and ordering information.

# OPERATION OF SCALES

## 3.00 GENERAL

The **SCALE-TRONIX®** second generation scales described in this manual all operate in a similar fashion. The scale's readout utilizes computer-controlled digital systems to provide such features as pushbutton zero, motion detection, units conversion, memory for recalling previous weights, printer and computer data output options, etc.

The portable scales are truly cordless. Power cords have been eliminated where possible with no compromise on battery life - typically in excess of 10,000 weighings for most units.

The typical operating procedure is very simple:

1. With scale empty, turn it on by pressing the "ON" pushbutton - (**ONE BEEP**)
2. Wait for automatic zero - (**TWO BEEPS**).
3. Place patient on scale and wait for the true weight to be displayed - (**THREE BEEPS**).

That is all there is to it - simple as 1,2,3! The scale will even shut itself off after 45 seconds of inactivity to conserve batteries, but will allow **successive weighing** of several patients. The time delay before shutting off is selectable by the operator through the "set-up" programming feature (see section 3.70) and can be changed if desired.

The weight can be displayed in either pounds or kilograms by pressing the appropriate pushbutton. The scale will "remember" the selected weight units and turn on in these units. By use of the "set-up" feature the operator can program the scale to display only in a particular unit.

If, after the weight is displayed (three beeps), you suspect that the weight might be erroneous due to someone touching the scale or patient, simply press **"RE WEIGH"** and the scale will calculate the weight again, beep three times, and re-display. The scale indicates motion by a series of dashes during the time

that the computer is determining the weight.

It's no problem if the patient exits the scale and you forgot the weight! Simply press the **"RE CALL"** pushbutton. The scale will display the last weight measured, and indicate so by blinking the **"PRIOR WEIGHT"** light for a few seconds.

**Note:** If the patient will be operating the scale to obtain self-weights, be sure to instruct them **not to continue to press on the readout's pushbuttons** while the weighing process is taking place! Press the **"ON"** pushbutton once, remove fingers from the control panel, and stand clear to wait for the accurate weight. (On a scale as sensitive as these, the force of continuing to press on the control panel while being weighed will be reflected as an error in the weight reading!)

On scales equipped with a handrail, the patient may hold on to the handrail to provide additional support. It is not permissible, however, to hold or touch other parts of the scale such as the readout, black steering handle, etc. (That is like leaning on the bathroom sink when weighing yourself at home; good for the ego, but clinically not acceptable!)

Get in the habit of using the audible beeps to assist you in the simple and proper operation of the scales. The beeper can easily be disabled by means of the set-up programming feature in those instances where its use isn't desirable.

## 3.10 POWER ON

Press the **"ON"** pushbutton located in the upper right-hand corner of the control panel to switch the scale on. The scale will beep once and then show **"888888"** with all annunciators lit as a test of the readout's display, then display the scale's model number (example: **"5002"**). During this time a number of self-tests are performed by the readout's internal electronics.

If no other actions are performed the scale will automatically shut off after about 45 seconds. If additional operating time is required, simply press the

"ON" switch to momentarily reset the readout's internal timer. To turn the scale "off" before the automatic timer does, press and hold the scale's "ON" pushbutton for a few seconds.

In the case of the model **5102** physician's office scale, the readout is left powered-on at all times, and will display "**0.0**" when the scale is empty. The model **6102** runs continuously on AC power, but because it employs an internal back-up battery for power outages, will time out after two (2) minutes during power outages.

### 3.20 ZEROING

It is a good technique to always turn the scale on "empty" to verify the proper zero value of the scale. The scale will then automatically establish a new "zero" value. In the case of the model **5002** stand-on scale, and the model **6502** chair scale, it is possible to stand or sit on the scale first and then turn it on. In this instance the scale knows that it cannot establish "zero" because a patient is already present, so it simply displays the weight using the previous "zero" value.

This cannot be done with the models **6002** and **6702** wheelchair scales or model **6202** ramp scale since the ramps could be either in the up or down position. These scales **must** be set to "zero" first by turning it on empty and allowing the automatic zeroing feature to operate. This can be done with ramps up or down. If the patient gets on the scale before turning it on, the patient will receive the prompt "**OFF SCALE PLEASE --**". Simply remove the patient from the scale, and wait for it to automatically go to zero (scale displays "**0.0**" and beeps twice); or press the "ZERO" pushbutton, wait for the two beeps, and continue weighing.

Operating tip: By use of the "ZERO" pushbutton it is possible to weigh babies and small children who would not otherwise be able to stand on the weighing deck. Have the nurse or mother stand on the scale and remain stationary while the "ZERO" pushbutton is pressed. Immediately after the scale obtains "zero" (two beeps and displays "**0.0**"), have the same nurse or mother hold the baby or small child while on the scale. The weight of the nurse or mother will automatically be subtracted from the total and the true weight of the baby will be displayed. While not as accurate as using a pediatric scale, a reasonably close weight will be obtained. A minimum weight of five (5) pounds is

required on early versions of these scales; newer models will weigh a minimum of one (1) pound.

The same type of zeroing technique can be used when placing a chair on the deck of the models **6002/6102/6702** wheelchair scales. Place the chair on the deck and press the "ZERO" pushbutton. The scale will beep two (2) times, then display "**0.0**". The weight of the chair is now automatically subtracted from the total, and a patient sitting in the chair will be weighed correctly. To continue with normal patient weighing after employing either technique, simply press the "ZERO" pushbutton with the weighing deck empty.

### 3.30 OBTAINING WEIGHT

Once the patient stands on the scale it will display a series of dashes indicating it is computing the weight. During this time the patient should remain motionless. If the scale is equipped with a handrail the patient may grasp it to help in remaining stationary. The black steering handle on the top of the readout should not be touched during the weighing process.

Once the weight is obtained the scale will beep three times and display the patient's weight.

### 3.31 WEIGHT UNITS

The weight may be displayed in either pounds (LB) or kilograms (KG) by selecting the appropriate front panel pushbutton. An annunciator on the front panel of the readout will illuminate to show the currently selected units. The weight units may be selected at any time during the weighing process.

The scale will remember the selected units when it is turned off. Upon powering it up it will automatically default to this previously selected unit.

By use of the set-up feature (see section 3.70) the scale can be programmed to display in either pounds only or kilograms only. It can also be programmed to display in resolutions other than 0.1 kilogram/pound (again see section 3.70).

### 3.32 REWEIGH

The "RE WEIGH" pushbutton provides a convenient method of re-obtaining the patient weight if

you suspect it is in error. This may happen if the patient was touching something other than the scale's handrail, or the patient was in some other way interfered with. Pressing the **"RE WEIGH"** pushbutton will cause the scale to display a series of dashed lines, then beep three (3) times and display the weight.

### 3.33 RECALL

The **"RE CALL"** pushbutton is used to display the previous patient's weight. After the patient steps off the scale and the display returns to **"0.0"**, the weight reading is automatically entered in the scale's non-volatile memory.

This stored weight can be displayed on demand by pressing the **"RE CALL"** pushbutton at any time. The weight will be displayed along with a flashing **"PRIOR WEIGHT"** annunciator as long as the **"RE CALL"** pushbutton is held; a quick press of the pushbutton will display it for several seconds.

This is a useful feature if the operator has forgotten to record the patient's weight or was otherwise occupied with the patient and prevented from recording it.

On newer versions of these scales (software versions 2.00 or higher) the weight can be displayed with the scale turned "off" by simply pressing the **"RE CALL"** pushbutton. The scale will automatically turn on, display the flashing **"PRIOR WEIGHT"** annunciator along with the weight value, then switch off several seconds after the **"RE CALL"** pushbutton is pressed. Earlier versions of the scale require that the scale first be powered "on".

### 3.34 MODEL 6502 FOOTREST / ARMREST

The model 6502 chair scale includes a slide-out footrest to insure accurate weighing. Once the patient is seated in the chair the footrest can be extended to provide a convenient place to rest their feet. The patient's feet should not touch the floor during the weighing process as this will affect the weight reading's accuracy. When finished weighing the patient the footrest can be returned to its retracted position to allow easier patient exit.

The armrests of the model 6502 fold-down to allow easy patient access to the chair. To fold the armrest squeeze the latch lever and press the armrest down. To restore it to its original position pull up on the arm

rest until it clicks into position.

### 3.40 ERROR MESSAGES: **"bAttrY"**, **"O-LOAD"**, **"CABLE"**, **"OFF SCALE PLEASE --"**, **"E-FAIL"**, **"r-FAIL"**

The internal microcomputer contained in the readout constantly monitors the scale's operation and uses the display to indicate error conditions when they arise. An explanation of these messages is given below:

a.) **"bAttrY"** : Indicates the battery has become depleted to the point that it can no longer operate the scale. Replace the battery to continue operation.

b.) **"O-LOAD"** : Shows that the scale platform's weighing capacity has been exceeded. Refer to the inside front cover specifications for maximum capacity.

c.) **"CABLE"** : Displays that the transducer signal is well in excess of its maximum value. This is usually caused by the transducer cable being disconnected. Check the cable connection between the readout and the weighing platform. On scales with a mast (5002, 6002, etc.) check the connection at the base of the mast.

d.) **"OFF SCALE PLEASE --"** : Ramp equipped scales (6002, 6702, etc.) require that a "zero" value be established before the patient enters the weighing platform area. Remove the patient from the weighing platform and allow the scale to obtain "zero".

e.) **"E-FAIL"**, **"r-FAIL"** : Shows that a memory failure has occurred in the internal microcomputer's memory. Requires service of the scale.

### 3.50 OPTIONAL PRINTER

On certain model scales a digital paper tape printer can be supplied. The printer provides a convenient printed record of the weight. Space is provided on the tape printout to write in the patient's

name or ID, room number, and date, if desired. See the sample weight ticket printed below:

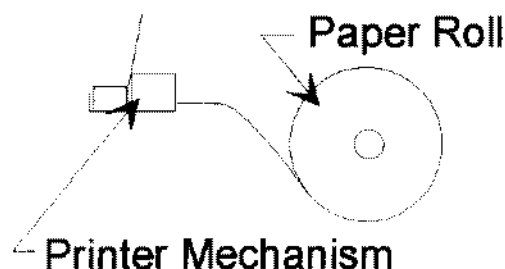
<b>SCALE-TRONIX</b>	
MODEL 6102	
WEIGHT: 75.3 KILOGRAMS	
-----	
PATIENT	ROOM
-----	
DATE	TIME

The printer will only print a valid weight. It will not print when the scale is reading "**0.0**" or is empty. It will print the prior weight if that feature is currently activated. Press the front panel "**PRINT**" pushbutton to activate the printer. A single beep should be heard, then the printer will power-up and begin printing. A series of four (4) short beeps signifies that an invalid print request was made (weight not displayed on scale; weight ticket already being printed). A series of four (4) long beeps signals an internal problem with the printer (such as a jammed print head or disconnected cable). No provision is made to detect an out of paper condition.

Printing may occur after the patient has left the scale. To print the previous patient's weight press the "**RE CALL**" pushbutton followed by the "**PRINT**" pushbutton. The "**PRIOR WEIGHT**" annunciator will flash, and the scale's readout will display the previous patient's weight for a short time while the printing continues. The scale will not automatically shut-off until the printing is completed.

Various set-up options are available for the printer. These include "auto" print (weight is printed automatically on display), print only in selected units regardless of front panel display, etc. See the section pertaining to "**SET-UP**", section 3.70, for further information.

The printer mounts to the rear of the digital readout of some portable scales (**5002**, **6002**, **6502**, **6702**). An internally mounted printer is available for the model **5102** and **6102** scales.



**PRINTER PAPER LOADING DIAGRAM**

The printer is a modern thermal type using a specially coated paper. The paper should be 2¼" wide by approximately 1⅞" in diameter. One roll of paper will produce approximately 525 weight tickets. No ink ribbons are required. Additional rolls of paper can be purchased at many stationary supply stores or directly from **SCALE-TRONIX®**. Order part number 23709 / 390043).

Paper is loaded through a removable access door on most scale models. Be sure to install the paper as shown in the illustration.

### **3.51 COMPUTER DATA OUTPUT**

In lieu of the internal printer option a computer data output (RS-232 serial format) is available as an option on most scales. This output can be used to send the patient weight data to a data collection system, personal computer, or external printer. A separate addendum is available which describes in detail the operation of this feature. Consult the factory for further details.

### **3.60 BATTERY REPLACEMENT**

Heavy duty alkaline-type cells should be used in your **SCALE-TRONIX®** portable scale. These are commonly known as "Duracell type MN1300". A total of six (6) "D" size cells (ANSI/NEDA type 13A, IEC type LR20) are installed in a plastic battery holder contained within the readout cabinet. Use of less powerful carbon-zinc batteries is not recommended.

Typical battery life is in excess of one year depending on usage. Excessive use of the printer will reduce battery life somewhat. When the battery voltage drops

below a preset level the "LO BATT" annunciator light will blink signalling the operator that the battery is wearing down. This is a preliminary warning. Immediate action is not required as there are several weighings left in the battery when the "LO BATT" warning is activated. The batteries should be replaced within a few days of this warning.

A second low battery condition is detected when the voltage is inadequate to accurately operate the scale. At this point the "LO BATT" annunciator will continue to blink, and the scale will display "**bAttrY**" on the weight display accompanied by a series of four long beeps. This is done to eliminate the possibility of displaying erroneous weights by preventing the scale from being used. If the batteries are replaced when the "LO BATT" signal activates this additional "low-low battery" signal will never be seen.

The batteries for the models **5002**, **6002**, **6502**, and **6702** are located under an access door on the rear of the mast. Two "quarter-turn" fasteners hold the cover in place. Use a dime coin or screwdriver to rotate the fastener a quarter of a turn. Replace all six (6) of the cells with fresh alkaline heavy-duty batteries. Be sure to observe proper polarity of the cells as they are installed. Replace the cover and fasten securely with the quarter-turn fastener using a dime or screwdriver.

Depending on the readout configuration the batteries for the model **5602** may be accessed by removing a cover or the top of the readout cabinet. These may be size "D" or "C" alkaline cells.

The date of battery replacement should be noted on the battery replacement label provided on the underside of the cover. In situations where the scale is not used extensively the batteries should be replaced annually just as a precaution.

The model **6102** built-in scale employs a rechargeable nickel-cadmium battery to power the internal printer and provide operation during power outages. This battery should last several years in normal operation but will eventually deteriorate due to age. The replacement battery is **SCALE-TRONIX®** part number 360007.

To replace the **6102**'s battery unplug the readout or turn off the circuit breaker providing power to the scale. Press and hold the "ON" pushbutton to switch the scale "off". Remove the front panel of the readout to expose

the battery. Unplug the battery's white connector from the power supply board by pulling straight up. Remove the old battery from its holder (it may be taped in place) and install the new battery. Insert the new battery's connector on the exposed power supply pins. Re-attach the front panel and restore operating power. Turn the scale back on by pressing the "ON" pushbutton and observe that the front panel "CHARGE" indicator is lit.

### 3.70 SPECIAL PROGRAMMING FEATURES

Your **SCALE-TRONIX®** second generation weighing scale incorporates a unique feature that lets you "customize" the scale to best suit your needs. This "set-up" mode allows the characteristics of the scale to match your particular requirements. Items that can be selected include the automatic shut-off time, weight resolution, weighing units, automatic printing, etc.

#### 3.71 ENTERING THE "SET-UP" MODE

To enter the "set-up" mode start with the scale turned off. Note the small "ST" logo ("**ST**") located directly above the "**RE CALL**" pushbutton on the front panel of the readout. This "**ST**" actually contains a small hidden pushbutton. Press and hold this "**ST**" pushbutton on the front panel while turning the power on with the "ON" pushbutton. (Use the rocker power switch in place of the "ON" button on the models **5102** and **6202**.) Once the scale turns on release the "**ST**" pushbutton, then press and release it 5 more times. The scale will display "**Set-UP**" and produce a series of four long beeps. "Set-up" mode has now been entered.

The "**RE CALL**" pushbutton is used to select the particular option value. Once this value is selected the scale can be advanced to the next option by again pressing the "**ST**" pushbutton or it can be shut-off by pressing and holding the "ON" pushbutton. (Use the rocker power switch in place of the "ON" button on the models **5102** and **6202**.) When the scale is turned back on, normal scale operation will then resume using the newly programmed features.

#### 3.72 SETTING THE OPTIONS

First enter the "**SET-UP**" mode as explained above.

1.) Press the "**ST**" pushbutton. The scale will display "**SOFF**" (software version). Press the "**ST**"



pushbutton again. The software version will be displayed (e.i. "**U 1.12.2**"). This is provided as a reference aid in determining which features are contained within the software.

2.) Press the "**ST**" pushbutton. The scale will display "**dAtE**" (date). Again press the "**ST**" pushbutton. The release date of the software will be displayed. A display of "**03.26.96**" would correspond to March 26th, 1996. This is provided as a reference aid in determining which features are contained within the software.

3.) Press the "**ST**" pushbutton. The scale will display "**SCALE**". Press the "**ST**" pushbutton again; the model number of the scale will be displayed (i.e: "**5002**", "**6002**", etc.). This is provided as a reference aid to help with customer trouble-shooting and is set at the factory.

4.) Press the "**ST**" pushbutton. If the scale's serial number has been programmed at the factory the scale will display "**SER no.**" (serial number). Press the "**ST**" pushbutton again; the serial number of the scale will be displayed (e.i. "**10563**"). This is provided as a reference aid to help with customer trouble-shooting and is set at the factory. Newer versions of the software (10/07/95 or later) skip these displays if the serial number has not been entered at the factory.

5.) Press the "**ST**" pushbutton. The scale will display "**AutoOFF**" (automatic shut-off time). Again press the "**ST**" pushbutton. The currently selected number of seconds before the scale shuts-off will be displayed. This is normally set at the factory to be 45 seconds (120 seconds for the model **6102**). It can be altered in 15 second increments from 15 seconds to 180 seconds (3 minutes). An additional "**Cont**" (continuous) option is provided for some special applications; this prevents the scale from automatically shutting-off; the scale can then only be turned off by pressing and holding the "**ON**" pushbutton. Use of the continuous mode of operation is not recommended since it will discharge the battery. Portable scales equipped with the optional power supply (see section 2.90) may have this option set to continuous since there is no problem with battery discharge.

To alter the length of the automatic shut-off time press the "**RE CALL**" pushbutton. The automatic shut-off time will advance through the available options. Stop at the desired time interval.

Line powered scales which remain on continuously, such as the model **5102** physician's office scale and the model **6202** ramp scale, should display "**AC OP**", indicating "AC operation". This is programmed at the factory and cannot be changed in the "set-up" mode.

6.) Press the "**ST**" pushbutton. Newer versions of the scale will display "**AC con**" (AC power continuous operation). Older versions of the scale (software versions below 2.00) will not provide this option, skip to paragraph 7 below. This feature is used in the model **6102** built-in scale to cause the scale to remain "on" as long as AC power is provided (automatic shut-off will not occur).

Pressing the "**ST**" pushbutton again will show this option selected as "**On**" or "**OFF**". To alter the selection press the "**RE CALL**" pushbutton. This option should remain set at "**OFF**" except for the model **6102** built-in scale.

7.) Press the "**ST**" pushbutton. The scale will display "**RES**" (resolution of weight). Press the "**ST**" pushbutton again. The "**POUNDS**" and "**KILOGRAMS**" annunciators will light and two numbers will be displayed. These numbers represent the selected resolution of the scale. Pressing the "**RE CALL**" pushbutton will allow the following selections:

0.1 pounds	/	0.05 kilograms
0.1 pounds	/	0.1 kilograms
0.2 pounds	/	0.1 kilograms
0.5 pounds	/	0.2 kilograms
1.0 pounds	/	0.5 kilograms

Normal factory selection is 0.1 pounds / 0.1 kilograms. Since the scale uses the selected resolution to determine weight lock-in, use of a larger resolution will reduce waiting time, particularly for unsteady patients.

8.) Press the "**ST**" pushbutton. The scale will display "**Units**" (weight units). Press the "**ST**" pushbutton again. The "**POUNDS**" and "**KILOGRAMS**" annunciators will light according to the selected weight units. Option choices of "**POUNDS**" and "**KILOGRAMS**", "**KILOGRAMS**" only and "**POUNDS**" only may be selected by use of the "**RE CALL**" pushbutton. If a particular weight unit is disabled, its front panel pushbutton will no longer operate and may be covered with a strip of tape to prevent confusion.

9.) Press the "**ST**" pushbutton. The scale will

display **"BEEPER"** (audio beeper). Press the **"ST"** pushbutton again. **"On"** or **"OFF"** will be displayed. This may be changed by pressing the **"RE CALL"** pushbutton. Setting this option to **"OFF"** will eliminate the audible signal that occurs when a front panel pushbutton is pressed or a weight is locked in.

10.) Press the **"ST"** pushbutton. If equipped at the factory with the optional data port or built-in printer the scale will display **"rS-232"**, indicating the start of the serial data port options. If this option is not provided skip to paragraph 14 below. The optional serial data port on the **SCALE-TRONIX®** second generation scales is used to send weight data to the built-in printer (if so equipped) or an external data collection device, such as a personal computer.

11.) Press the **"ST"** pushbutton. The scale will display **"OutPut"**. Again press the **"ST"** pushbutton. The display will show the currently selected data port output option.

NOTE: For operation of the internal built-in printer this must be set at **"StPr1"** (SCALE-TRONIX® printer #1). Setting the **"OutPut"** option to one of the other printer selections can cause erroneous operation of the scale and/or printer.

If the optional data port is used for data transmission to a computer or other device (**"OutPut"** set to **"dAtA"**), or to a an external printer (**"OutPut"** set to **IMP-24, IMP-56, CI3110**, etc.) refer to the more detailed addendum included with your scale which explains setting up the various data port communication parameters (baud rate, parity, etc.).

This option may also be set to **"OFF"**, which will disable the internal printer. If the printer is disabled, the front panel **"PRINT"** pushbutton will no longer operate and may be covered with a strip of tape to prevent confusion.

12.) Press the **"ST"** pushbutton. The scale will display **"PrtUnt"** (print units). Again press the **"ST"** pushbutton; the **"POUNDS"** and **"KILOGRAMS"** annunciators will illuminate to indicate which print units are selected. By pressing the **"RE CALL"** pushbutton the following selections can be made:

a.) **"POUNDS"** and **"KILOGRAMS"** lit: Print output is whatever unit is selected on the

scale's front panel. This is the normal default setting.

b.) **"KILOGRAMS"** lit: Prints weight only in **Kilograms** regardless of scale's present front panel weighing units selection.

c.) **"POUNDS"** lit: Prints weight only in **Pounds** regardless of scale's present front panel weighing units selection.

Note: The printing mode is independent of the weight units option mode. As an example, if the weighing units are selected as **"POUNDS"** only, the print units can be selected to print in **"KILOGRAMS"** only.

13.) Press the **"ST"** pushbutton. The scale will display **"PriOPt"** (print option). By pressing the **"RE CALL"** pushbutton the following selections can be made:

a.) **"PnlPrt"** (Panel Print): Weight is printed when the front panel **"PRINT"** pushbutton is pressed. This is the normal factory (default) setting.

b.) **"AutPrt"** (Auto Print): Weight is automatically printed when weight "lock-in" occurs. (Note: The front panel **"PRINT"** pushbutton is still active and may be pressed to obtain an additional weight ticket.)

14.) Press the **"ST"** pushbutton. The scale will display **"PC brd"** (printed circuit board). Pressing the **"ST"** pushbutton again will display the model number of the printed circuit board (i.e. **"23005"**). Another press of the **"ST"** pushbutton will show the revision level of the printed circuit (i.e. **"01"**). These are provided for informational trouble-shooting purposes and cannot be changed in set-up mode.

15.) Pressing the **"ST"** pushbutton one last time returns the scale to the introductory **"Set-UP"** mode. The scale may be turned off by pressing and holding the **"ON"** pushbutton (use the power rocker switch for the models **5102** and **6202**), or the option list may be run-through another time. If left alone the scale will automatically shut-off after three (3) minutes (except models **5102** and **6202**). (The selected automatic shut-off time is temporarily lengthened when the scale is operating in the special **"Set-UP"** mode.)

### **3.80 POWER SUPPLY / CHARGER OPTION**

A power supply / charger option is available which eliminates the need for disposable dry cells to operate the scale. This option may be ordered at the time of the scale's purchase or added later (see section 2.90). It is available as a power supply only or as a combination power supply / charger / rechargeable battery. The addition of the charger and rechargeable battery pack allows portable, cordless operation.

The battery is charged automatically any time the scale is plugged-in, as indicated by the illuminated front panel "CHARGE" annunciator. A fully discharged battery requires approximately 8 - 12 hours to completely recharge. During this period the scale may also be used for patient weighing. Since there is no danger of over-charging the battery the scale may be left plugged-in continuously.

To obtain optimum performance, annual replacement of the nickel-cadmium battery pack is recommended. It is **SCALE-TRONIX®** part number 360002 / 20009.

### **3.90 STORAGE**

The portable scales should be stored in a safe place such as equipment storage room, closet, etc. It is no longer necessary to store the scales near an electrical outlet as in the past for recharging of the batteries. Try not to leave the scales in a busy hallway where somebody could trip on them or run into them with a food cart, X-ray, etc.

### **3.100 MAINTENANCE**

Contact the factory for electronic maintenance or operating problems. Most problems can be quickly diagnosed on the phone. Any repairs or replacements can be handled quickly at a reasonable cost.

To keep your scale in top working order the following preventative maintenance measures apply:

- 1.) Check calibration annually or as required.
- 2.) Inspect weighing platform for loose mounting components.

- 3.) Check weighing platform's cable and connector for integrity.
- 4.) Inspect line cord (if supplied) for abrasion or other signs of wear.
- 5.) Do not expose scale to excessive water or moisture.
- 6.) Do not store the scale where heavy objects may be set on it

### **3.110 FACTORY RETURNS**

In returning any components to the factory, please use the original shipping containers designed for this purpose.

You must call our factory service department at 630-653-3377 for a proper RMA (Returned Material Authorization) number and shipping instructions and special address. You will be advised exactly what part to return. We rarely need to have the complete scale returned. This will save you time and expense.

#### **RMA NUMBERS MUST BE OBTAINED FROM THE FACTORY PRIOR TO RETURNING ANY ITEM.**

When calling the factory for service assistance, the serial number and model number of the scale must be mentioned at the beginning of the call to allow our service staff to quickly access the manufacturing records, calibration data, service records, and other pertinent information concerning that particular scale. (These numbers can be found on the data label attached to the weighing platform and the readout.)

**DO NOT SHIP ANYTHING TO THE WHITE PLAINS, NEW YORK ADDRESS. This will only cause delays as the items will be returned to you.**

**RMA NUMBERS MUST BE OBTAINED FROM THE FACTORY PRIOR TO RETURNING ANY ITEM.**

### **CAUTION:**

**THE SCALES ARE NOT TO BE USED FOR TRANSPORTING PATIENTS OR ITEMS. DAMAGE TO THE SCALE OR PATIENT INJURY COULD RESULT AS WELL AS VOIDING ALL WARRANTIES.**

Readout electronics consist of the following:

1. Differential signal amplification.
2. Additional amplification and signal filtering.
3. Analog-to-Digital (A/D) converter and Clock circuit.
4. Battery and support circuitry, voltage regulators, power supplies, etc.
5. Microcomputer and support circuitry.
6. Display board.
7. Printer assembly.
8. Printer interface board.
9. Printer controller board.

#### 4.21 DIFFERENTIAL SIGNAL AMPLIFICATION

The weight dependent output signal produced by the load cell transducers in the weighing frame is a "differential signal", meaning it is the voltage difference between the "+ Signal" and "- Signal" leads. Integrated circuit U4, an instrumentation amplifier, is used to interface to this differential signal and amplify it.

The output signal from the load cells is applied to the protection network consisting of diodes CR4/CR5/CR6/CR7. These diodes prevent destructive overvoltages caused by static discharges from damaging U4. A high frequency filter, formed by L1/L2/C9/C10 couples the weight signal to the input of U4. In U4 the differential signal is amplified by a factor of 100, and converted to a "ground-referenced" voltage for further processing.

Capacitors C16/C17/C24 provide local bypassing of the power supplies used by instrumentation amplifier U4. Capacitor C18 furnishes compensation of U4 by reducing amplification at higher frequencies.

#### 4.22 ADDITIONAL AMPLIFICATION AND SIGNAL FILTERING

Components for an optional second gain stage may be added on the printed circuit board. If included

operational amplifier U5 is used to provide additional gain and signal filtering. U5, together with capacitors C14/C15 and resistors R17/R18, forms an active low-pass filter. This helps to remove fluctuations in the weight signal caused by movement of the patient on the scale. U5, like U4, is "chopper-stabilized" to correct internal offset and drift errors.

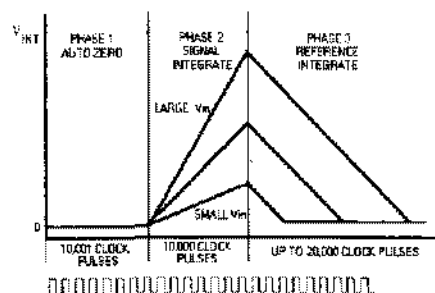
Resistors R24/R25 (optional) are used to increase gain; resistors R26/R27 (optional) are used for gain reduction. An additional low-pass filter stage is furnished by resistor R34 and capacitor C23.

#### 4.23 ANALOG-TO-DIGITAL (A/D) CONVERSION

Integrated circuit U6 is the analog-to-digital converter. Included on this integrated circuit are auto-zero functions, auto-polarity, and the digital and analog functions necessary to perform dual slope integration conversion to 20,000 counts (4½ digits). The weight signal voltage is applied to the analog input (pin 10) of U6.

A reference voltage for the conversion is applied to pin 2 of U6. The reference voltage, nominally 1 Volt, is derived from the load cell transducer excitation voltage, by the divider network consisting of resistors R29, R30, and potentiometer P1. Adjusting P1 sets the "span" or weight calibration of the scale.

The system clock, applied at pin 22 of U6, is used to



**A/D CONVERTER TIMING DIAGRAM**

precisely time and control the phases of the dual slope conversion process. Refer to the converter timing diagram when reading the following description.

#### 4.23.1 PHASE 1, AUTO ZERO

During auto zero, the errors in the analog components (offset voltages of buffers, comparators, etc.) will be automatically nulled out. This is performed by internal logic that disconnects the input pins (9 & 10) from the applied analog signal, connects them to ground, then closes an internal feedback loop such that offset error information is stored in the "auto zero" capacitor, C21. Also during this phase, "reference capacitor" C22 is charged to the voltage present on "Vref" (pin 2 of U6).

#### 4.23.2 PHASE 2, SIGNAL INTEGRATE

The input signal is reconnected and then integrated for exactly 10,000 clock pulses. On completion of the integration period, the voltage V is directly proportional to the input voltage, corresponding to the weight applied to the scale. Capacitor C20 is the integration capacitor, with resistor R32 setting the integration current. At the end of this phase the input signal polarity is determined.

#### 4.23.3 PHASE 3, REF. INTEGRATE, SIGNAL DE-INTEGRATE

The input to the integrator is switched from the input signal to reference capacitor C22. Internal switches connect capacitor C22 to the integrator input so that its polarity is opposite that of the previously applied input signal. This causes the integrator to discharge back towards zero. The number of clock pulses counted between the beginning of this cycle and the time when the integrator output passes through zero is a digital measure of the magnitude of the input signal. This count is stored in an internal latch on U6 for output to the microcomputer.

#### 4.23.4 ZERO INTEGRATOR PHASE

One minor additional phase is included to insure that the integration capacitor C20 is fully discharged to zero volts. This typically lasts 100-200 counts.)

#### 4.23.5 CLOCK CIRCUIT

A clock is required for the A/D converter, integrated circuit U6.

**23005 R01 board:** Integrated circuit U2 is a dual timer circuit. One half (pins 8,9,12,13) is connected as an astable oscillator and used to generate a system clock for the A/D converter. Resistors R6, R7 and capacitor C2 set the clock frequency to approximately 150 KHz.

**23005 R02 board:** A clock signal is generated internally in microcomputer U7 and appears on port pin "P1.0". The frequency is internally set by the microcomputer's software and is nominally 120 KHz.

#### 4.24 POWER SWITCHING, VOLTAGE REGULATION, AND SUPPORT CIRCUITRY

Depending upon their configuration, **SCALE-TRONIX®** second generation scales may contain disposable primary cells (models 5002, 5602, 6002, 6502, 6702), an AC power supply (models 5102, 6202), or an AC power supply with rechargeable batteries (model 6102). (Note that some models may be specially ordered to utilize a different power supply than is normally provided; refer to the technical description that best matches the particular scale.) Additional circuitry is included to switch the battery supply, provide voltage regulation, and detect low battery voltage conditions.

##### 4.24.1 BATTERY SWITCHING

In order to conserve battery life the battery supply is switched on and off as needed by the scale.

**23005 R01 board:** Transistor Q1 is a series switch which applies battery voltage to the remainder of the circuitry. Q1 is controlled by transistor Q2 which, in turn, is controlled by one-half of dual timer U1. This half of U1 (pins 1,2,4,5,8,10) is configured as a bi-stable latch to keep the battery power "on" once set.

To initiate power-on Q1 is turned on through momentary closure of membrane switch S9 ("ON") and diode CR1. The switch closure is also coupled through diode CR2 to set latch U1, thus keeping Q1 and Q2 "on" when S9 is released. The switch closure is also coupled through diode CR10 to signal input pin "PB.7" of port expander U7 that the "ON" switch is pressed. (Because the model 5102 remains on constantly, transistor Q1 is permanently wired "on" by use of a jumper across J2 or JTEST.)

The battery power remains on until microcomputer U10 decides to shut it off in response to lack of scale activity by setting pin 4 of U1 and setting the latch "off".

Resistors R1, R2, R3, and R5 are included for proper circuit biasing. Capacitor C6 is used as an output filter.

**23005 R02 board:** Transistor Q1 is a series switch which applies battery voltage to the remainder of the circuitry. Q1 is controlled by transistor Q2 which, in turn, is controlled by "watchdog timer" circuit U11.

To initiate power-on Q1 is turned on through momentary closure of membrane switch S9 ("ON") and diode CR10; diode CR13 is used to signal input pin "PB.7" of port expander U7 that the "ON" switch is pressed.

A secondary turn-on circuit occurs through diode CR12 and switch S3 ("RE CALL") to allow display of the previously stored weight if the scale is presently turned "off". The switch closure is also coupled through diode CR14 to signal input pin "PB.1" of port expander U7 that the "RE CALL" switch is pressed.

Once Q1 is on and voltage is applied to the circuit, watchdog timer U11 will keep transistor Q2 on through output line /WDO and resistor R5, subsequently keeping transistor Q1 energized. If no further action occurs an internal timer contained within watchdog timer U11 will time-out after approximately 1.6 seconds and switch off Q2, causing Q1 to turn off and remove power from the scale's circuitry. (Because the model 5102 remains on constantly, transistor Q1 is permanently wired "on" by use of a jumper across J2 or JTEST.)

Once energized and properly running, microcomputer U10 will keep resetting watchdog timer U11 by periodically pulsing U11's input line, labeled "WDI". Should the scale's operating program call for shut-off, or a hardware/software failure of microcomputer U10 occurs, the reset pulses to U11 will no longer occur and 1.6 seconds later U11 will time-out and cause the circuit power to switch off. The model 5102 has a jumper added at location J7; this causes U11 to reset U10 in the event of a hardware/software failure.

Resistors R1, R2, R3, R5, and R14 are included for

proper circuit biasing. Capacitor C6 is used as an output filter.

#### 4.24.2 VOLTAGE REGULATION

Voltage regulators VR1 and VR2 render regulated sources of +5 Volts D.C. for operation of the analog (VAA) and digital (VCC) circuits, respectively. Use of two separate +5V regulators helps to prevent noisy digital signals from entering the sensitive analog circuits. Capacitors C3 and C8 are used to insure regulator stability.

#### 4.24.3 +9.5V/-7.5V SUPPLY

Integrated circuit U2 is used to convert +5 Volts D.C. to +9.5V and -7.5 Volts D.C. for use in the analog circuits. It contains an internal oscillator (operating at approximately 8 KHz) and a series of switches. During one half of the cycle capacitor C25 is connected between VAA and ground, charging C25 to VAA's potential of +5 Volts. During the other half cycle capacitor C25 is reconnected between VAA and pin 8 (negative lead of C25 to VAA) so that its voltage adds to VAA and charges filter capacitor C26 to approximately twice VAA or 9.5 to 10 Volts.

The remainder of U2 is used to generate a negative supply voltage. Capacitor C28 is connected between ground and the +9.5 Volt source on pin 8 during one half cycle of the internal oscillator. During the other half cycle it is reconnected between ground and pin 4 such that its negative lead is connected to pin 4. This transfers C28's charge into filter capacitor C27 and produces a negative voltage. Diodes CR8 and CR9 reduce the voltage slightly to obtain the desired -7.5 Volts.

#### 4.24.4 BATTERY MONITOR

Integrated circuit U3 is included to monitor the voltage of the battery and provide an indication to the scale's operator when battery replacement is required. Two states of weak battery operation are detected; "low-battery" (battery is usable but will soon need replacing) and "low-low battery" (battery is too weak to properly operate the scale).

Pins 1, 2 and 3 of U3 are connected to a voltage divider network consisting of R8, R9 and R10, to form the "low-battery" detector. The output of this circuit (pin 1) is normally low when the battery is good and

switches high when the battery is low. It is coupled to the busy signal of U6 (pin 21) through resistor R36 to the driver for the front panel **"LO BATT"** indicator. This causes the **"LO BATT"** indicator to flash when the battery is low.

The remaining half of U3, pins 5, 6, and 7, are connected to resistors R11, R12, and R13 to form the "low-low battery" detector. The output on pin 7, which is normally "high" with a good battery, goes "low" when the battery is too weak to reliably operate the scale. This output is connected to an I/O pin on microcomputer U10 to signal the microcomputer that "low-low" battery has been recognized.

The microcomputer U10 will process the "low-low" battery signal and cause **"bAttrY"** to appear on the scale's front panel display, in addition to the flashing **"LO BATT"** annunciator.

#### 4.24.5 CHARGE MONITOR CIRCUIT

An additional circuit is included on the instrument board for the model 6102 built-in scale. Transistor Q4, along with resistors R56, R57, and R58, is used to monitor the **"CHARGE"** annunciator line which illuminates the front panel indicator. Q4's collector is connected to an I/O pin of U7 to tell microcomputer U10 when the front panel **"CHARGE"** indicator is on. Software contained in U10 recognizes this and prevents the scale from automatically shutting-off when AC power is present. When AC power is not present, the **"CHARGE"** indicator is not energized, and the scale will shut off after some period of inactivity to prevent discharging the battery.

#### 4.25 MICROCOMPUTER AND SUPPORT CIRCUITS

To attain various additional features such as automatic zero tare, pounds/kilograms conversion, weight lock-in, previous weight memory, etc., a microcomputer is employed to additionally process the data supplied by the A/D converter. This microcomputer system consists of U10, a microcomputer; U7, a peripheral port expander to furnish additional input/output lines; U9, a non-volatile memory which stores the previous weight reading; and U11 (23005 R02 only), a device to generate reset conditions for the microcomputer.

During operation of the scale the microcomputer continually receives the weight readings from the A/D converter. This data is received in a "multiplexed" format (one digit at a time) from the output of the A/D converter (microcomputer input lines P1.0 through P1.6). The microcomputer also continually scans the keyboard (using U7) looking for closed switches. If a key press is sensed the microcomputer executes whatever action is called for in its program. After processing the A/D data the microcomputer assembles it for viewing and transfers it to the front panel display.

U10 is a complete microcomputer, containing a software program stored in read-only memory, read/write memory for temporary storage of program variables, an arithmetic logic unit, input/output and other control lines, etc. Crystal XTAL1 and capacitors C29/C30 form the clock oscillator which controls the internal timing of the microcomputer.

#### 4.25.1 PORT EXPANDER/KEYBOARD/BEEPER

Integrated circuit U7 is included to supplement the I/O (input/output) of the microcomputer system. U7 contains additional I/O lines (referred to as "ports"). Microcomputer U10 reads (from input lines) or writes (to output lines) data to U7 periodically by use of the data bus (lines DB0 through DB7) and the /RD and /WR lines.

The front panel keyboard is attached to some of U7's input port pins (PB.0 through PB.7, and PC.4). Resistor networks R42/R43 serve as "pull-ups" and keep the input pins at a "high" state (+5V) until a key switch is pressed; this pulls the respective input pin "low" (0V). The microcomputer will recognize this key press when it reads the input pins from U7 and if the key remains closed for a number of milliseconds the microcomputer will execute that key's function.

A four position "DIP" (dual in-line package) switch, SW1, may be optionally included. It is connected to U7's "C" port, lines PC.0 through PC.3. It is used to select software contained in U7.

A small audio annunciator is driven by transistor Q3, which in turn is controlled by U7's output pin PA.7. The annunciator gives a short beep as audible recognition of a key being pressed. The length of the beep and its various sequences are controlled by U10's software. Additional output lines of U7 are used to control the driver for annunciator lamps on the

display.

#### 4.25.2 NON-VOLATILE MEMORY

The internal memory of microcomputer U10 does not retain data when the power is switched off. Because some features of the scale may require lasting data retention (such as last weight recall) integrated circuit U is included. This device, called an "electrically erasable programmable read only memory", or "EEPROM" will store selected information for periods of up to 100 years.

Information needed to be stored to or retrieved from U is sent in serial form using the lines SCL (serial clock) and SDA (serial data). These are controlled by microcomputer U10. A data bit (a high or low level) is sent and received on SDA when the SCL line provides a pulse.

Resistors R54/R55 are provided as pull-ups on the SCL/SDA lines to insure the data and clock pulses are properly shaped. Capacitor C36 improves power supply bypassing.

#### 4.25.3 RESET GENERATION

In order for microcomputer U10 to properly execute its software instructions it must be initialized to the start of the program when power is first turned on. Reset pin 9 of U10 will accomplish this when it is set "high".

**23005 R01 board:** RC network C31/R40 is provided to generate a momentary pulse on power up which is coupled to the /RS pin of U10. No reset of port expander integrated circuit U7 is provided. U7's reset pin is permanently connected to ground through resistor R39.

**23005 R02 board:** A reset pulse of approximately 200 mS is automatically generated by "watchdog timer" U11 when the Vcc level rises above 4.65 volts. If Vcc is below 4.65 volts the reset line stays "high", keeping the microcomputer U10 in an inactive state. The reset pulse is also connected to port expander U7.

The model 5102 also contains a jumper on J7 that causes watchdog timer U11 to generate a reset pulse to U10 in the event of a watchdog timeout due to

hardware or software failure.

#### 4.30 DISPLAY BOARD

Presentation of the weight information is performed by the model 22DSDP display board. It incorporates LED (light-emitting diode) digits and annunciators to provide a clear, bright, easy-to-read display.

The weight value is displayed on six, 0.43" high common cathode digits. These are driven in a multiplexed fashion (one digit on at a time) by LED driver U1. U1 receives the digit display information from the microcomputer's parallel data bus (DB0-DB7) and automatically performs the multiplexing function. Resistor package RP1 sets the operating current level for the displays.

A variety of LED annunciator lamps are contained on the front panel to indicate "POUNDS" or "KILOGRAMS", "PRIOR WEIGHT", and "LO BATT". These annunciator lamps contain multiple LED's to provide an evenly illuminated surface. They are driven by integrated circuit U2. U2 receives the on/off information for the annunciators from microcomputer U10 via port expander circuit U7. Resistor packs RP2 and RP3 provide current limiting for the annunciators.

Display boards 22DSP R01, 22DSP R02, and 22DSP R03 are all equivalent in operation with some minor changes in board layout to improve spacings. Some minor differences in connections to the terminals of the resistor networks were also made to improve spacings.

#### 4.40 AC POWER SUPPLIES AND RECHARGEABLE BATTERIES

Some versions of the SCALE-TRONIX® second generation scales employ an AC power supply, or an AC supply with rechargeable batteries. These are described in more detail as follows:

##### 4.40.1 MODEL 11801 POWER SUPPLY

This is a small power supply that is often used in conjunction with a 6.0 volt, 450 Milli-amp hour nickel-cadmium battery pack.



Voltage step-down and isolation is provided by power transformer T1. A dual primary winding is provided to allow operation at either 120 VAC or 240 VAC. The power supply is protected against faults by a fuse or fuses wired into the primary circuit, depending on the scale's particular configuration.

Depending on the particular scale and configuration, a special safety rated capacitor may be used to remove noise from the AC line which might interfere with the scale's operation. An additional capacitor, and a ferrite toroid, may be added to the primary wiring to form a complete line filter.

Full-wave rectification of the transformer's secondary voltage is provided by diodes CR-1 and CR-2. Capacitor C-1 provides filtering. A power-on indicator is provided by light-emitting diode LED-1 and resistor R-1. Diode CR-3 prevents the battery from discharging into the power-on indicator and connects the rectified, filtered DC voltage to output connector J-1 for use by the scale's instrument board.

The 6.0 volt nickel-cadmium battery, composed of five (5) size "AA" cells, is charged by the current through resistor R-2. Schottky diode CR-4 is used as a "switch" to couple the battery voltage to output connector J-1 when AC power is removed and the battery is need to operate the scale.

A charge indicator circuit is provided by transistor Q-1 and light emitting diode LED-2. The voltage across charging resistor R-2 is monitored by Q-1, a pnp darlington transistor. Resistor R-3 provides current limiting for Q-1's base. When the battery is properly connected and charging, Q-1 will be switched "on" and provide a current path through limiting resistor R-4 and the "CHARGE" indicator located on the front panel of the readout. Note that if the battery is disconnected from the power supply board; or the power cable, instrument board, display cable, or display board are disconnected, the LED-2 charge indicator will not light.

#### 4.40.2 MODEL 23PWR-7 POWER SUPPLY

This is a larger power supply that is used in conjunction with a 7.2 volt, 1500 Milli-amp hour nickel-cadmium battery pack. The larger battery pack is needed to operate the internal printer option on the model 6102 and other scales.

Voltage step-down and isolation is provided by power transformer T301. A dual primary winding is provided to allow operation at either 120 VAC or 240 VAC. The power supply is protected against faults by two fuses wired into the primary circuit, which are mounted in holders on the power supply board.

Capacitor "CF", a special safety rated capacitor, is used to remove noise from the AC line which might interfere with the scale's operation. An additional capacitor, and a ferrite toroid, may be added to the primary wiring to form a line filter.

Diode rectifiers D301, D302, D303, and D304 are connected on T301's secondary to form a full-wave rectifier network with center-tap. Use of the center-tapped configuration provides two output voltage levels: A lower level for operating the scale's electronics, and a higher voltage to charge the battery pack.

Diode D305 connects the lower rectified voltage to capacitor C301 for filtering. This prevents the filtered DC voltage from appearing in the battery charging circuit. A power indicator is formed from the network of LED301 and current limiting resistor R301. Diode D306 connects the rectified, filtered DC voltage to connector J301 for use by the scale's instrument board.

The 7.2V battery pack consists of six (6) size "C" cells. Charging current for the battery pack is supplied through R303. No provision is made to filter this charging voltage.

Since the battery charging voltage is doubled in respect to the scale's operating voltage, operating the scale without the battery could apply potentially large voltages to the readout's instrument board. Zener diodes D309 and D310 clamp this voltage to a safe level if the battery is removed. Diode D308 is provided to prevent damage to D309 and D310 if the battery is somehow incorrectly connected.

The battery pack is directly connected to connector J302 to provide voltage to operate the internal printer. Diode D307, a schottky rectifier, is used to couple the battery voltage to the instrument board when AC power is not present.

Polymer fuse F303 is used to protect the battery pack from damage should a short occur in the scale's

wiring. This device is self-resetting and will restore operation once the short is removed.

A charge indicator circuit is provided by LED302 and current limiting resistor R302. A jumper contained in the battery wiring (pins 2 and 3) completes the circuit. The charge indicator is wired in series with the scale's front panel "CHARGE" annunciator. Note that if the battery is disconnected from the power supply board; or the power cable, instrument board, display cable, or display board are disconnected, the LED302 charge indicator will not light. Note also that the charge indicator is monitored on some scales to tell the readout's microcomputer that AC power is present and thus prevent automatic shut-off (see section 4.24.5, "CHARGE MONITOR CIRCUIT").

#### 4.50 PRINTER GENERAL

This internal printer employs a thermal type print mechanism which heats a specially coated paper to produce the resulting paper ticket. The total printing system consists of three assemblies:

- 1.) Mechanical printer assembly with motor and thermal print head, model EPT-1014LW2 or model EPT-2014S2L.
- 2.) Printer interface board assembly, model EPT-R1002 or model EPT-R2002
- 3.) Printer controller board assembly, model 23PRTR02, 23PRTR03 or 23PRTR04.

**Note:** The mechanical printer assemblies and printer interface board assemblies must match as follows: printer EPT-1014LW2 uses the EPT-R1002 interface board; printer EPT-2014S2L uses the EPT-R2002 interface board. The 23PRTR02, 23PRTR03, and 23PRTR04 printer controller board assemblies are interchangeable.

#### 4.51 MECHANICAL PRINTER ASSEMBLY

The mechanical printer assembly employs a thermal print head consisting of a vertical row of eight (8) small resistors, each of which when momentarily heated produce a small dot on the specially treated thermal paper. The use of a thermal type of printing mechanism eliminates the need for ribbons or ink

cartridges and provides quiet, maintenance-free operation.

A stepper motor positions the head across the paper as the printing occurs, driving it from the left most "home" position to the far right. Printing occurs during this left-to-right sweep of the print head. A total of 144 dot positions (horizontally) are available for printing.

Specific control of the print head resistors is performed by the printer interface board which develops all the necessary timing and synchronization. When the printing head reaches the far right position (printing of a line is finished) the stepper motor reverses direction and returns the print head to the home position. During this reverse of the print head travel a mechanical cam assembly engages which simultaneously lifts the print head from its contact with the paper and advances the paper one line. A switch located in the printer mechanism closes to indicate when the print head has finally returned to its home position.

The printer is supplied as an assembly and has no serviceable parts.

#### 4.52 PRINTER INTERFACE BOARD

A separate printer interface board is provided to perform all the timing, synchronization, decoding, and driving of the printer. The printer interface board can receive the character print information in either serial or parallel format. In this application the interface receives the characters to be printed from the scale's instrument board via a serial interface in standard ASCII format.

The interface board contains its own microcontroller with memory, along with the various drivers needed to support the print head resistors and stepper motor. A single flex cable connects the printer mechanism to the interface board.

Operation of the printer interface board is directed by the internal software of the microcontroller. Various operating options of the interface board (type of printer, serial or parallel interface, parity, bits, baud rate, etc.) are controlled by the position of programming jumpers. Jumper positions are as follows:

#### EPT-1014LW2 printer and EPT-R1002 interface:

"ON" jumpers: SW3, SW4, SW5, SW7, SW8, SW9, SW10

"OFF" (or removed) jumpers: SW1, SW2, SW6, SW11, SW12

#### EPT-2014S2L printer and EPT-R2002 interface:

"ON" jumpers: SW2, SW4, SW7, SW8, SW10

"OFF" (or removed) jumpers: SW1, SW3, SW5, SW6, SW9, SW11, SW12

Contact the factory service department if additional help regarding the proper jumper positions is needed.

The interface board is considered a non-repairable assembly, although some limited information may be available from the factory service department. A schematic is included in this manual.

### **4.53 PRINTER CONTROLLER BOARD TYPES 23PRTR02/23PRTR03/23PRTR04**

An additional printer component is the printer controller board. The printer controller board is used to link the scale's instrument board and the printer interface board. It also acts like a switch and voltage regulator to provide a regulated source of +5 volts DC to operate the printer and printer interface board while printing. The voltage is removed when the printing stops to conserve battery life. Schematics of these controllers are included for the following technical descriptions.

### **4.54 PRINTER CONTROLLER VOLTAGE REGULATION**

The primary purpose of the printer controller board is to provide a source of switched, regulated +5 volts DC. Integrated circuit U201 is a 5 volt regulator which works in conjunction with transistor Q201. The output voltage is applied to U201's feedback pin labeled "FB". U201's output pin ("DRV") will drive Q201's base through biasing resistors R201 and R202 in order to maintain a precise +5 volts out. Unregulated battery voltage is applied through connector J201 and regulated +5 volts is available at J204.

Transistors Q202 and Q203 are used to switch the voltage regulation "on" only when the printer is needed so as to conserve battery life. Q203 receives an "on" signal from the instrument board's "RTS" line through biasing resistors R210 and R211. Q203 then turns on Q202 through biasing resistors R203 and R204. When Q202 is switched on it allows U201 to drive Q201.

Capacitors C201 and C202 serve as input and output filters respectively. Light emitting diode LED201 and its current limiting resistor R209 are provided as a power-on indicator to help with trouble-shooting. Schottky diode BAT42/BAT85 is added for reverse battery protection.

### **NOTE: REVERSE BATTERY MODIFICATION**

Some early versions of the 23PRTR02 & 23PRTR03 printer controller board did not contain sufficient protection against reverse battery insertion. Capacitor C201 should be changed from a 47uF/16V tantalum to a 47uF/35V aluminum electrolytic. A type BAT42 or BAT85 schottky diode should be added to the base and collector of Q201, with the cathode of the BAT42/BAT85 connected to the base of Q201 (see schematic). The 23PRTR04 board has this diode, CR203, already added.

### **4.55 CONTROL SIGNAL SUMMATION**

The printer interface board provides some control signals to tell the scale's instrument board when the printer is ready to accept data. These lines connect to the controller board on J203, pins 2, 3, 4, and are labeled "RTS" (ready-to-send), "DTR" (data terminal ready), and "/ERROR". For simplicity these are logically summed together to produce a single ready signal.

On the 23PRTR02 controller board this is done by nand gate U202 and the result appears on J202, pin 2. Current limiting resistor R212 is included to interface to the scale's instrument board "CTS" (clear-to-send) line. Note: When interfacing to a 23005R02 instrument board, diode CR204, a 1N914 small signal diode, should be added in parallel to resistor R212 as shown on the schematic.

The 23PRTR03/23PRTR04 assemblies are similar, except U202(B), a 1-of-4 decoder gate, is used to logically sum the various control lines together.

Current limiting resistor R207 is included to interface to the scale's instrument board "CTS" (clear-to-send) line. Note: When interfacing to a 23005R02 instrument board, diode CR204, a 1N914 small signal diode, should be added in parallel to resistor R207 as shown on the schematic.

Resistor R205 is provided as a "pull-up" for the printer interface board's reset line ("/RESET"), located at pin 6 of J203.

#### **4.56 PRINT DATA SIGNAL**

The data to be printed is applied to J202, pin 5, the TXD (transmit data) line from the scale's instrument board. The data signal receives no additional processing and is applied directly to the printer interface board's "RXD" line (received data) at J203, pin 1.

#### **4.57 MANUAL PAPER ADVANCE, TYPE 23PRTR02 ONLY**

Some additional circuitry is included to provide a manual paper advance for loading the paper roll. The manual paper advance must first apply power to the printer interface board, then set the "/PF" line (paper feed). The "/PF" line must be brought to ground to perform the paper advance.

Pressing switch S201 turns on transistor Q202 through diode CR201. The switch also turns off transistor Q204 (through diode CR202) which is normally biased "on" by resistor R206. Capacitor C203 begins charging through resistor R207, causing voltage to appear across R207 and the printer interface board's "/PF" line (paper feed), located on pin 5 of J203. As charging completes the voltage across R207 drops until the "/PF" line signal becomes sufficiently low to start the paper advance function.

#### **4.58 MANUAL PAPER ADVANCE, TYPES 23PRTR03/23PRTR04 ONLY**

The manual paper advance on the 23PRTR03/23PRTR04 provides the same type of function as described above, but is accomplished in a slightly different manner. Rather than employ a resistor-capacitor time constant to generate a delay when first turned on, logic gating is employed.

The "RTS" line from the printer interface board, pin 2

of J203, is used as an input to U202(A), a 1-of-4 decoder. The paper advance switch, S201, is also used as an input to U202(A), through diode CR202. Resistor R206 biases U202(A)'s inputs so they are normally "high" ("pull-up" resistor). When S201 is pressed the +5 volt power supply will be switched on immediately through diode CR201 turning on Q202. After a short period of time (about 1-2 seconds) the printer interface board is ready; its "RTS" line (pin 2 of J203) will go "low". This will enable pin 15 of U202(A). The output of U202(A), pin 12, will pull the "/PF" line (paper feed), located on pin 5 of J203, "low", starting the printer's paper advance.

### **4.60 TROUBLE SHOOTING PROCEDURES**

The following simplified trouble shooting procedures are recommended for identifying defective system components. Certain corrective measures are provided. More complicated servicing should only be performed by the factory or authorized service facilities. Most problems can be solved on the telephone. Problems requiring factory service are usually handled quickly and the scale is on its way back within 24 hours. Call first to discuss the problem.

#### **4.60.1 DISPLAY DOES NOT ILLUMINATE**

Check that known good cells are properly installed in the battery holder, or in the case of AC operated scales, that the readout is plugged-in. On AC powered readouts check if the internal power-on L.E.D. is illuminated; if not check the line fuse(s).

Check that the battery connector is properly connected to "J1 POWER" on the instrument circuit board. Check that the cable between the display board and instrument board is connected. Check that the membrane keyboard is connected to the display board. Measurements of the D.C. supply voltages can be made with a DVM or analog multimeter.

#### **4.60.2 WEIGHT READING NOT ACCURATE**

This can commonly be caused by a mechanical obstruction of the weighing platform. Check that the platform is not touching some foreign object so that it is restricted in its downward movement. Also check that the connecting cable is firmly plugged into the instrument circuit board (marked "J4 LOAD CELL"). On those scales with

masts check the mast cable for a firm connection to the base.

#### 4.60.3 WEIGHT READING TAKES EXCESSIVE TIME TO DISPLAY

If the platform is in motion the scale will wait for it to settle before displaying the weight. This can be caused by excessive patient motion.

Also check that the connecting cable is firmly plugged into the readout cabinet. Examine the weighing platform that it is not rubbing against a foreign object.

#### 4.60.4 SCALE DISPLAYS "CABLE" OR "O-LOAD"

This indicates the scale's internal microcomputer has received a signal in excess of its expected value. "O-LOAD" indicates the weight signal is larger than the maximum value assigned to that particular model (see specifications on inside front cover). If the weight value is within the specified range this indicates a damaged transducer or defective instrument board.

The "CABLE" display indicates a signal outside the range of the internal a-d converter has been applied. This is most likely caused by a damaged or disconnected transducer cable. On those scales with a mast check the connection to the weighing platform at its base. Also check the internal connection of the four wire cable to the "J1 LOAD CELL" connector.

#### 4.60.5 READING DOES NOT CHANGE WHEN WEIGHT APPLIED

Check that the weight platform is plugged into the readout. The platform cable, connector or load cell transducer may be defective. The load cell transducer's resistance can be checked with an ohmmeter after unplugging from the readout. The proper resistance values are listed below:

##### SCALES with gauged-plate load cell (5002, 5102, 6002, 6502):

WIRE COLORS (PIN no.)	RESISTANCE
GRN(1)/BLK(2)/WHT(3)/RED(4) to scale frame	>10M $\Omega$
GRN(1) to BLK(2)	200-250 $\Omega$

WHT(3) to RED(4)

170-180 $\Omega$

##### SCALES with twin DEBB (6102, 6202, 6702):

WIRE COLORS (PIN no.)	RESISTANCE
GRN(1)/BLK(2)/WHT(3)/RED(4) to scale frame	>10M $\Omega$
GRN(1) to BLK(2)	175-225 $\Omega$
WHT(3) to RED(4)	170-180 $\Omega$

##### SCALES with single point bending beam load cell (5602):

WIRE COLORS (PIN no.)	RESISTANCE
GRN(1)/BLK(2)/WHT(3)/RED(4) to scale frame	>10M $\Omega$
GRN(1) to BLK(2)	175-225 $\Omega$
WHT(3) to RED(4)	170-180 $\Omega$

Consult factory if readings differ from those shown.

**NOTE:** Ohmmeters will not indicate a change in resistance of the load cell transducer when weights are applied to scale. This is due to the extremely small change in resistance of the strain gauges employed (<1 ohm) and the fact that the bridge configuration presents a constant value of resistance when measured from its terminals.

#### 4.60.6 NON-FUNCTIONING KEY(S)

Check the front panel keyboard for visible signs of damage (punctures, dents, etc.). Check that keyboard tail with connector is properly inserted into the display board.

If a particular function does not work (example: no kilogram units) check if that particular function is turned off in the "SET-UP" mode (see section 3.70)

#### 4.60.7 ERROR MESSAGE DISPLAYED: "E-FAIL" or "r-FAIL"

This indicates a failure of the internal

microcomputer's memory during the start-up self-test. "E-FAIL" indicates a failure of the microcomputer's eprom memory during the checksum test. "r-FAIL" shows a failure of the random access memory. Both conditions require replacement of the microcomputer.

#### **4.60.8 NO PRINT, FOUR SHORT BEEPS**

This indicates a print request was made when a valid weight is not present. The patient's weight must be currently displayed on the scale's readout before the printer will function, or alternately, the "PRIOR WEIGHT" can be printed if the "PRINT" button is pressed immediately after pressing the "RECALL" button.

A second reason for this problem is if the print pushbutton is pressed while a ticket is currently printing. If this occurs simply wait for the current ticket to complete printing before requesting another by pressing the "PRINT" button.

#### **4.60.9 NO PRINT, FOUR LONG BEEPS**

This is a signal to signify a problem with the printer. It is produced when the printer is not ready to accept data from the scale. This usually indicates a defective printer mechanism or interface board, or a print head which is mechanically stuck and can not return to the "home" (left most) position. Check that the printer head assembly can move freely on its carriage. Check for jammed paper in the printer mechanism.

Also check for disconnected cables between the scale's instrument board, the printer interface board, the printer controller board, and the printer. Note that the flex circuit from the mechanical printer assembly must be correctly inserted in the connector marked "CNA" on the printer interface board. Observe LED201 on the printer controller board, it should light immediately when the print button is pressed.

#### **4.60.10 PRINTER RUNS BUT RESULT IS BLANK OR FAINT**

This is generally indicative of a problem with the paper used for printing. This printer uses "thermal" type printing paper; using ordinary plain paper will not produce a printed result. Also, note that since thermal printing paper is coated on one

side only, inserting the paper upside-down will result in a blank weight ticket.

There are differences between the sensitivities of various thermal type papers, which can result in variations of print contrast. If a suitable local source cannot be found order the paper directly from **SCALE-TRONIX®** at the New York sales number listed in the inside front cover of this manual. The paper is part number 390044 / 23709.

Inspect the printer mechanism to ensure the print head has not become dislodged or otherwise separated from contacting the paper.

#### **4.60.11 PRINT RESULT DISTORTED, MISSING DOT(S)**

This can be caused by a defect in either the printer's head assembly or the printer interface board. Check the print head resistors with an ohmmeter. They should measure approximately 15-20 ohms when measured at the flexible circuit from the printer and should all be approximately the same resistance. (Pins 1 - 8 that mates at connector "CNA" of the printer interface board, resistor common is pins 9/10/11.) If the print head resistors check ok the problem may be in the printer interface board.

#### **4.60.12 LOW BATTERY LIGHT FLASHES DURING PRINTING**

This is caused by a battery which is becoming weak. The large amount of power demanded by the printer taxes the battery more than regular weighing use of the scale. Some occasional flashing while printing is acceptable. Replace battery when possible.

#### **4.60.13 PRINTED PAPER TICKET TEARS POORLY, UNEVENLY**

Inspect the tear bar mounted in the enclosure top cover for signs of damage (missing teeth, cracks, etc.). A metal tear bar is available to replace the earlier plastic version and improve the "tear-off" performance. Check with the factory service department (phone number & address inside front cover) for additional details.

## 4.70 CALIBRATION

Your scale has been carefully calibrated at the factory. This calibration involves matching and tuning of the load cells and readout electronics. The scale calibration should be checked annually. Only use calibrated, certified scale test weights for this purpose. Traction or physical therapy weights are **NOT** acceptable since their actual weight can often be in error as much as +/-10%. Calibration weights may be purchased from **SCALE-TRONIX®** or a local scale dealer. An alternative to calibration weights is the weight comparison method. This requires a known accurate, calibrated scale. A fixed weight is "weighed" on the calibrated scale; then the same weight is placed on the scale for comparison.

### PRECISION TEST CALIBRATION WEIGHTS ARE AVAILABLE FROM SCALE-TRONIX®.

### THREE (3) 25 KILOGRAM TEST WEIGHTS ARE RECOMMENDED.

### ORDER PART NO. 20021. (25 KG Test Weights)

Large changes in calibration often indicate a damaged load cell or faulty readout component. It is generally recommended that if calibration is necessary for your scale it should be returned to the factory. Calibration procedure follows for those situations where this is not desirable. Calibration should not be attempted by those not having the proper tools or knowledge of electronic systems and their attendant shock hazards.

### CALIBRATION MODE:

Some versions of the printed circuit board contain a blue "dip switch" consisting of 4 switches in one package located in one corner of the main printed circuit board. These switches control the calibration mode described in section 4.71 below. If your board contains these switches use that calibration procedure. Later versions use a front panel access procedure for entering the calibration mode consisting of specific sequence of button pushing during power up. This procedure is described in section 4.72.

## 4.71 CALIBRATION PROCEDURE (WITH DIP SWITCHES)

Switch the readout into "calibration mode" by first noting and recording the position of the individual rockers (1 through 4) of DIP switch SW1. Then set each rocker of DIP switch SW1 to the "off" position. Remove any items from the platform. Turn the power on by pressing the "ON" pushbutton on the front panel. (On battery powered readouts a jumper lead or programming shunt can be connected between pins 1 and 2 of J2 on the 23005 instrument board to prevent the readout from timing out and shutting off during the calibration process.)

The readout will power-up and eventually display a number, which represents the zero offset value of the platform and load cell transducers, in tenths of pounds (0.1 pound). Note and record this value. (Even though your scale may be "kilograms only" in operation, pounds are used internally because of their finer resolution.) Units conversion is as follows:

10.0 Kilograms = 22.0 (22.046) pounds.  
25.0 Kilograms = 55.1 (55.116) pounds.  
50.0 Kilograms = 110.2 (110.231) pounds.  
75.0 Kilograms = 165.3 (165.346) pounds.

Add the specified test weight to the platform. Note the new number displayed. Subtract the original zero offset value from this new number to obtain the scale's displayed value of the calibration weight.

(**Example:** The zero offset value is "117" (representing 11.7 pounds). Adding the specified three 25 kilogram test weights (equivalent to 165.3 pounds) to the platform produces a reading of "1771". The difference is  $1771 - 117 = 1654$  (equivalent to 165.4 pounds). This would indicate the calibration is 0.1 pound "high".

Using the specified three 25 kilogram test weights a difference of 165.3 +/- 0.1 pound should be obtained. If necessary adjust potentiometer P1 (span adj.) on the instrument board until the correct value is obtained. Remove the test weights and recheck the zero offset value. Note that adjusting P1 may also alter the zero offset value. Repeat the process as necessary to obtain the correct difference.

Once the calibration is satisfactory reset DIP switch SW1 to its original position and allow the scale to time

out).

#### 4.72 CALIBRATION PROCEDURE (WITHOUT DIP SWITCHES)

This procedure is similar to section 4.71 with the exception of how to enter the calibration mode. Dip switches have been eliminated; however, the calibration procedure still uses the calibration potentiometer on the main printed circuit board.

Enter the "calibration mode" by following **exactly** the procedure outlined below:

1. Be sure scale is off.
2. Press and hold in the "RE WEIGH" pushbutton.
3. While pressing the "RE WEIGH" pushbutton press and release the "ON" pushbutton. On scales that do not employ the "ON" pushbutton, such as the model 5102, turn the power rocker switch on while pressing "RE WEIGH".
4. **NOTE:** The "ST" pushbutton is a special hidden programming and test pushbutton located under the **SCALE-TRONIX®** logo ("ST") on the left side of the front panel between the "ZERO" and "RE CALL" pushbuttons.

After the scale displays the test pattern of "888888" release the "RE WEIGH" button and press the "ST" pushbutton five (5) times. This will cause the readout to enter the calibration mode. The display will indicate "CAL".

5. Press the "ST" pushbutton once more; the display will indicate "A-d". This indicates the start of the "raw" analog-to-digital converter data being inputted to the micro processor.
6. Press the "ST" pushbutton one more time. The number displayed is now the raw analog to digital data.
7. The automatic turn-off timer has also been programmed for an extended "on" period to

give you time to calibrate the scale. This time period is three minutes. The scale may be turned off before this time period by simply pressing and holding the "ON" pushbutton. Hold it in for several seconds until the power shuts off. If additional time is needed to complete the calibration procedure, press the "ON" pushbutton briefly. This will reset the timer for an additional three minutes.

Now that you are in the calibration mode the calibration procedure is the same as in section 4.71. That procedure is repeated here for your convenience.

The readout is displaying a number, which represents the zero offset value of the platform and load cell transducers, in tenths of pounds (0.1 pound). Note and record this value. (Even though your scale may be "kilograms only" in operation, pounds are used internally because of their finer resolution.) Units conversion is as follows:

1.0 Kilogram	= 2.2 (2.2046) pounds
5.0 Kilograms	= 5.5 (5.51) pounds
10.0 Kilograms	= 22.0 (22.046) pounds.
25.0 Kilograms	= 55.1 (55.116) pounds.
50.0 Kilograms	= 110.2 (110.231) pounds.
75.0 Kilograms	= 165.3 (165.346) pounds.
100 Kilograms	= 220.4 (220.46) pounds.

Add the specified test weight to the platform. Note the new number displayed. Subtract the original zero offset value from this new number to obtain the scale's displayed value of the calibration weight.

Note: Early versions of the software did not display the decimal point in the a-d calibration mode, i.e.: 11.7 pounds is displayed as "117".

**(Example:** The zero offset value is "11.7" (representing 11.7 pounds). Adding the specified three 25 kilogram test weights (equivalent to 165.3 pounds) to the platform produces a reading of "177.1". The difference is  $177.1 - 11.7 = 165.4$  (equivalent to 165.4 pounds). This would indicate the calibration is 0.1 pound "high".

Using the specified three 25 kilogram test weights a difference of 165.3 +/- 0.1 pound should be obtained. If necessary adjust potentiometer P1 (span adj.) on the instrument board until the correct value is



obtained. Remove the test weight and recheck the zero offset value. Note that adjusting P1 may also alter the zero offset value. Repeat the process as necessary to obtain the correct difference.

Now you may turn the scale off by pressing the "ON" pushbutton and holding it in for a few seconds. That will force it to turn off. You may also wait for it to time out and turn off by itself.

#### **4.80 FACTORY SERVICE HELP**

If service information is to be obtained by calling the factory, the serial number and model number of the scale must be communicated at the beginning of the call to allow our service staff to quickly access the manufacturing records, calibration data, service records, and other pertinent information concerning that particular scale. (These numbers can be found on the data label attached to the rear of the enclosure.)

**NOTE: IN ALL CASES, CALL THE FACTORY BEFORE RETURNING ANY PARTS OR SCALES FOR REPAIRS. MOST PROBLEMS CAN BE DIAGNOSED AND SOLVED ON THE PHONE BY MAKING A FEW TESTS.**

**IT IS ALWAYS NECESSARY TO CONTACT THE FACTORY FOR A RETURN AUTHORIZATION NUMBER, SHIPPING INSTRUCTIONS AND ADDRESS. CALL 630-653-3377.**

**DO NOT SHIP SCALE TO THE NEW YORK FACILITY.**

# PARTS LIST AND SCHEMATIC

Note: Call the factory service department for those parts not listed. Due to revisions and improvements it is suggested that you confirm the part number with the factory service department before placing an order. Phone number for factory service is located on inside front cover. Note: Part number below consists of both the **SCALE-TRONIX®** revised ("new") part number and the original ("old") part number in the format "revised / original".

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
<b>BASE COMPONENTS</b>		039207 / 66009	6702 Ramp
130121 / 50205	Mounting bolts - mast	531004 / 66006	Non-skid mat (12 x 11¾")
132047 / 48207	Flat washers - mast	<b>MAST COMPONENTS</b>	
135017 / 50514	4" rubber wheel, gray	039213 / 50207	Scale mast
133058 / 50314	Wheel bushing - 5/16 x 1 "	039159 / 50211	Battery door
138013 / 50214	String guard for wheel	530135 / 23329	Battery usage label ("D" cell)
130149 / 51523	Shoulder bolts for wheel	134048 / 50201	1/4 turn stud for battery door (black)
131037 / 52523	Hex nut for wheel	134042 / 50203	1/4 turn stud retainer/washer
530160 / 50234	Scale-Tronix® label - black	134049 / 50202	1/4 turn stud receptacle
130133 / 66164	Platform mounting screws	136006 / 50204	"Pop" rivet 3/32" x 3/8"
630154	5002 gauged plate assembly	130202 / 50236	10-32 x ½" Flat head socket screw (black)
630155	6002/6502 gauged plate assembly	<b>READOUT COMPONENTS</b>	
400016 / 20067	DEBB II Load cell	039212 / 50208	Readout cabinet w/ battery mount
039162 / 50217	Black plastic dust cover 18" x 19½" (5002 only)	039157 / 50209	Readout front cover/panel
039174 / 50505	Black plastic dust cover 14" x 18" (5102 only)	039158 / 50210	Readout rear recess cover
030022 / 65208	6502 Platform	540018 / 46511	Front panel keyboard overlay, <u>black</u> (early version)
630142	6502 Commode assy	720003 / 50221	Front panel keyboard assy., complete w/ overlay & conn. <u>black</u> (early version)
130131 / 65009	¼-20 x 1¼" thumb screw	540004	Front panel keyboard overlay, <u>gray</u> (later version)
531003 / 65013	Non-skid mat (12 x 20")	720004	Front panel keyboard assy., complete w/ overlay & conn. <u>gray</u> (later version)
039198 / 61606	6002 Platform		
029057 / 63606	6002 Hinge		
039201 / 62606	6002 Ramp		
130081/ 50535	10-32 x ¼" button head screw		
531002 / 64606	Non-skid mat (12 X 9¾")		
039206 / 66008	6702 Platform		
029058 / 66010	6702 Hinge		

<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
530159 / 50220 130203 / 50237	Instruction label #10 x 1/4" Button head screw (black)	700101	PC board assembly, power supply, 6102, cur. version
039161 / 50216 029050 / 50253	Readout handle Readout handle mounting block	270018 / 40531 270010 / 48311	Fuse, 1/8 A, 250V, slo-blo Fuse cover / insulator
029051 / 50254 130197 / 50238	Readout handle mounting channel Readout handle mounting screws	390045 / 23712 390046 / 23713 700052	Printer mechanism assembly (EPT-2104S2L) Printer Interface PCB assembly (EPT-R2002) 23PRTRXX printer controller pcb assembly
630115 / 50252 360006 / 50251	Battery holder assembly (6 "D" cell) w/ wires and connector 3 cell "D" battery holder	390044 / 23709 750034 / 50218	Printer paper, roll Display cable (28 cond.)

### **ELECTRONIC COMPONENTS**

101057 / 50240 Load cell connector 4 ckt  
750001 / 50219 Mast cable assy w/  
connectors

700029 / 23005R01S PC board assembly,  
instrument (early ver.)  
700049 / 23005R02S PC board assembly,  
instrument (all ex 6102)  
700051 PC board assembly,  
instrument (6102 only)

450003 Microcomputer w/software,  
V 1.XX.5 (early 5002/6502)  
450006 Microcomputer w/software,  
V 2.XX.5 (cur. 5002/6502)  
450004 Microcomputer w/software,  
V 1.XX.6 (early 6002/6502/  
6702)  
450007 Microcomputer w/software,  
V 2.XX.6 (cur. 6002/6502/  
6702)  
450010 Microcomputer w/software,  
V 2.XX.0 (cur. 6102)

700027 / 22DSDP-S PC board assembly,  
display

700004 PC board assembly, power  
supply, 6102, early version

### **PARTS SHIPPED WITH SCALE**

070032 / 50222 Operating and Service  
manual  
092008 / 50539 5/32" Long arm allen wrench  
092004 / 20116 1/8" Short arm allen wrench

360001 / HS-202 "D" Cell battery  
360007 7.2V rechargeable battery  
pack (for 6102)

### **OPTIONS**

845000 / 50224 Handrail for 5002  
846000 / 60224 Handrail for 6002 / 6702

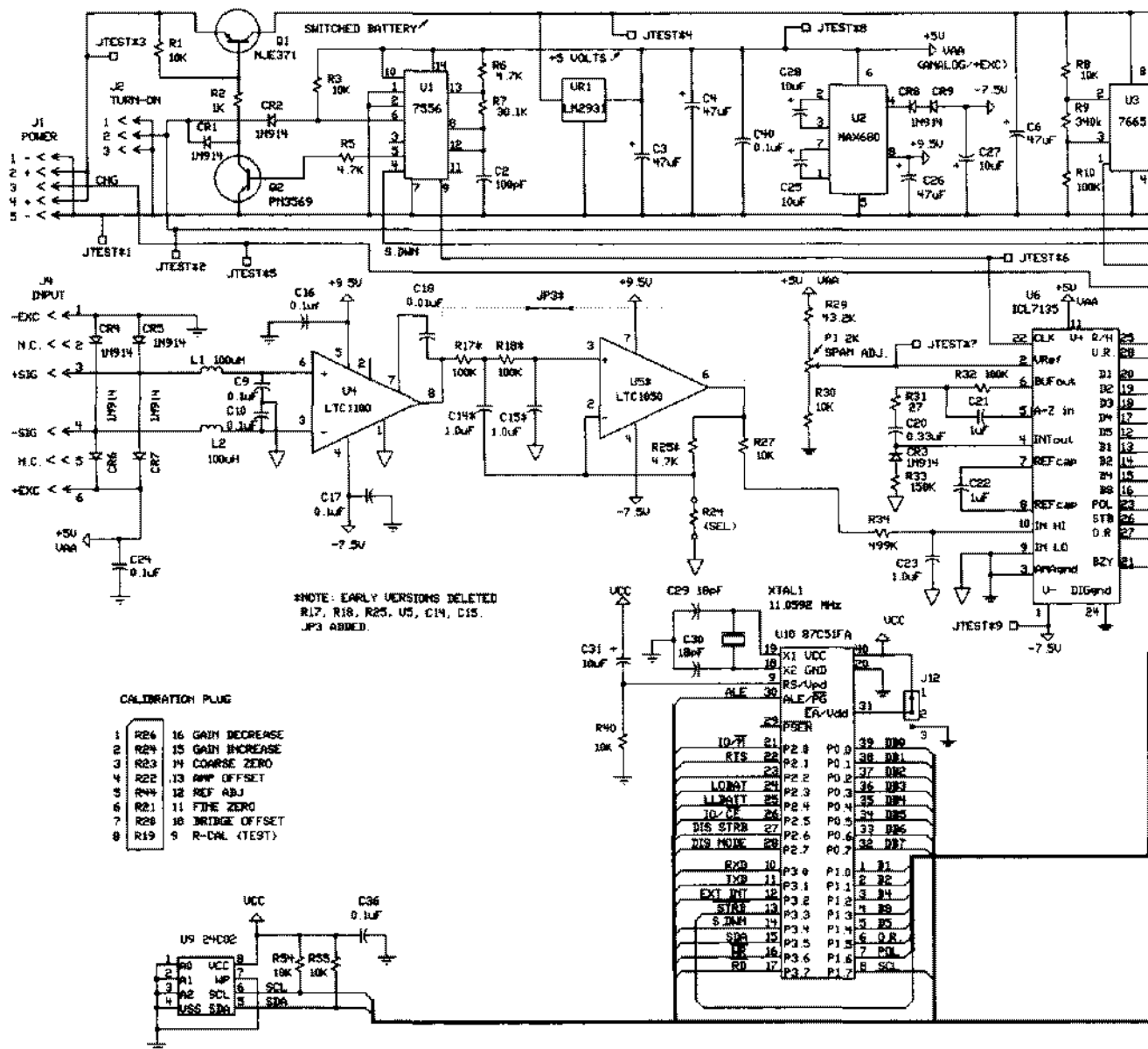
845001 / 50227 Height gauge for 5002 /  
6002  
846001 / 67227 Height gauge for 6702

845002 / 50231 Printer for 5002 / 6002 /  
6502 / 6702  
846112 Add-on printer for 6102

845006 / 5060-PSC Power supply / charger  
module w/ battery (5002/  
6002/6502/6702 w/o printer)

845004 / 5060-PS Power supply only (5002/  
6002/6502/6702 w/o printer)

360002 / 20009 Replacement rechargeable  
battery pack for 845006 /  
5060-PSC



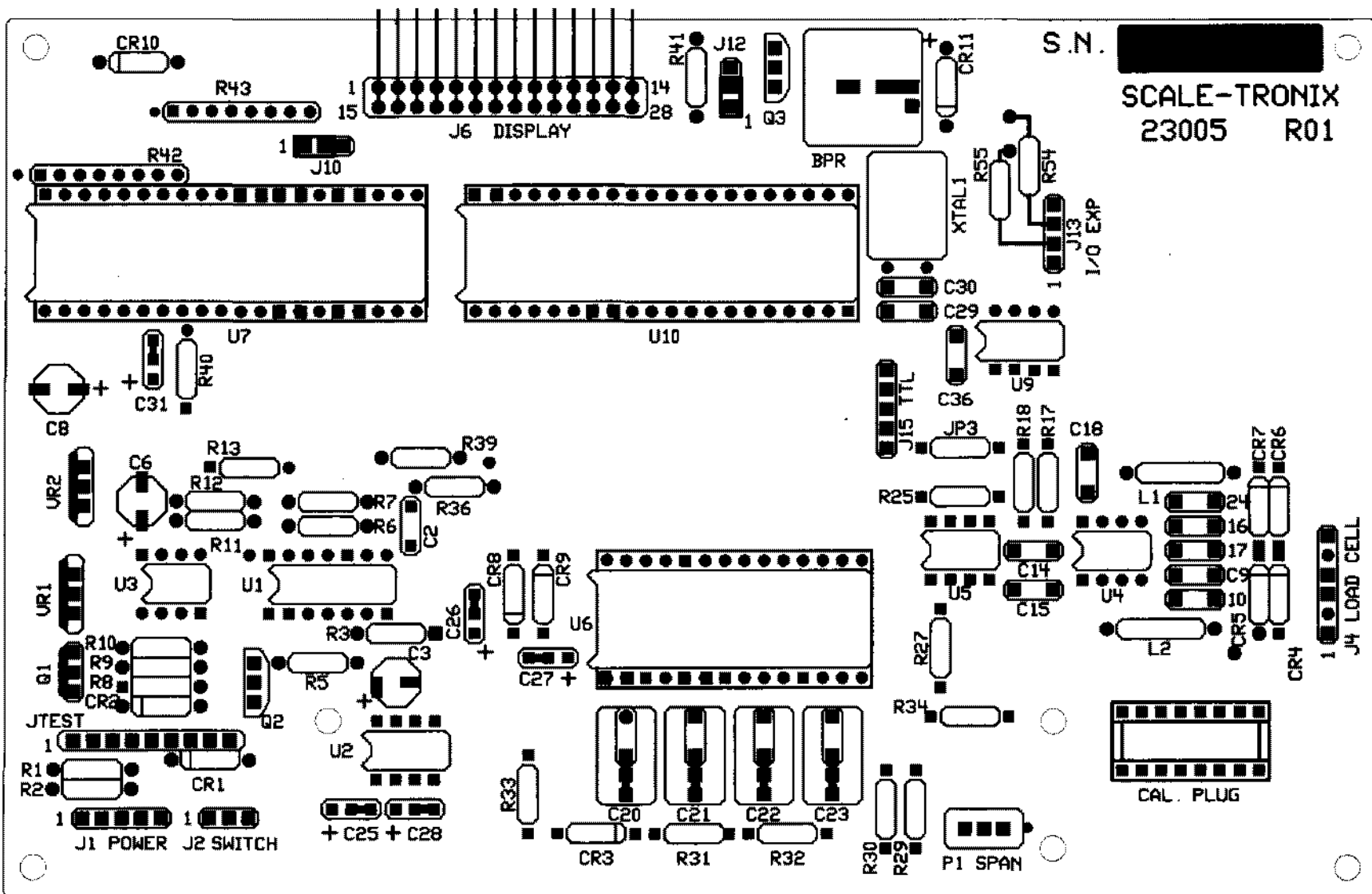
5002/5102/5602/6002//6202/

07/09/97

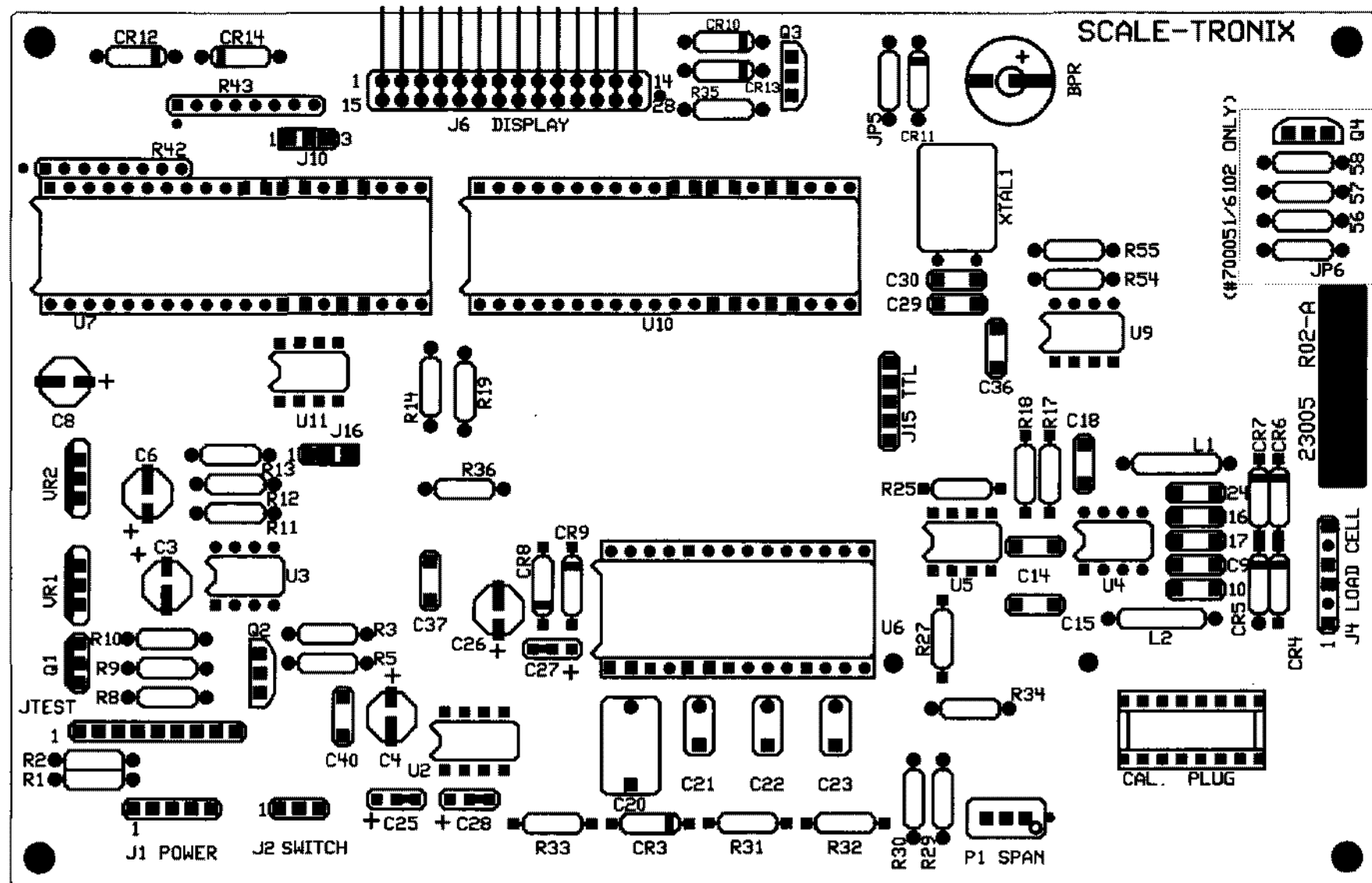




07/09/97

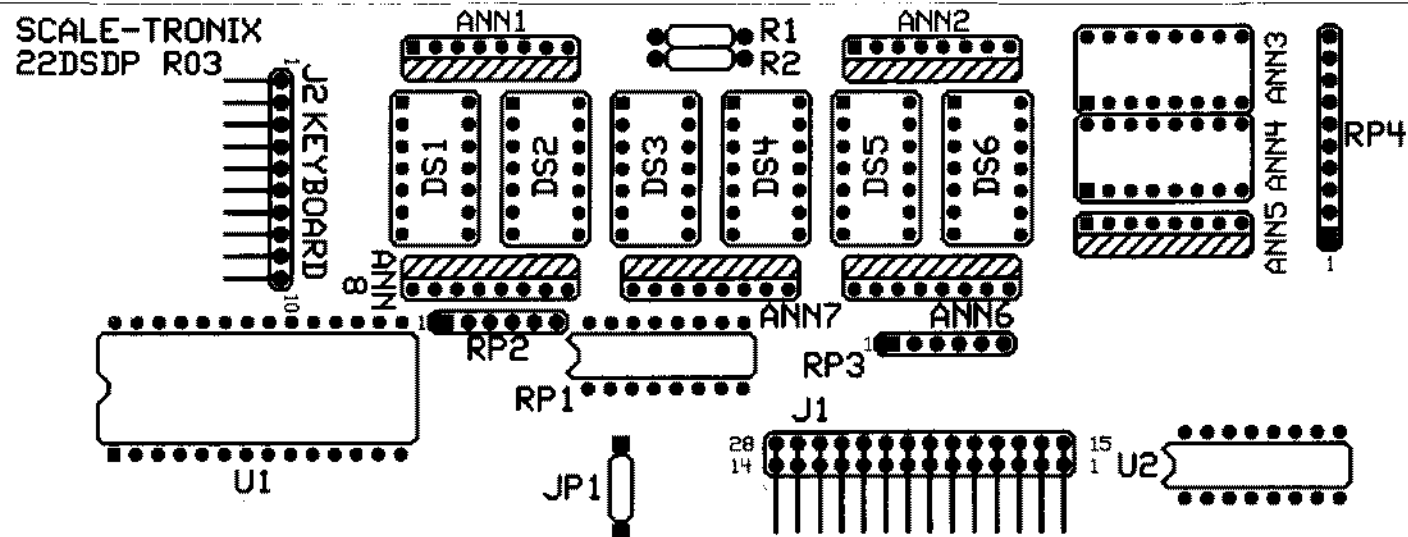




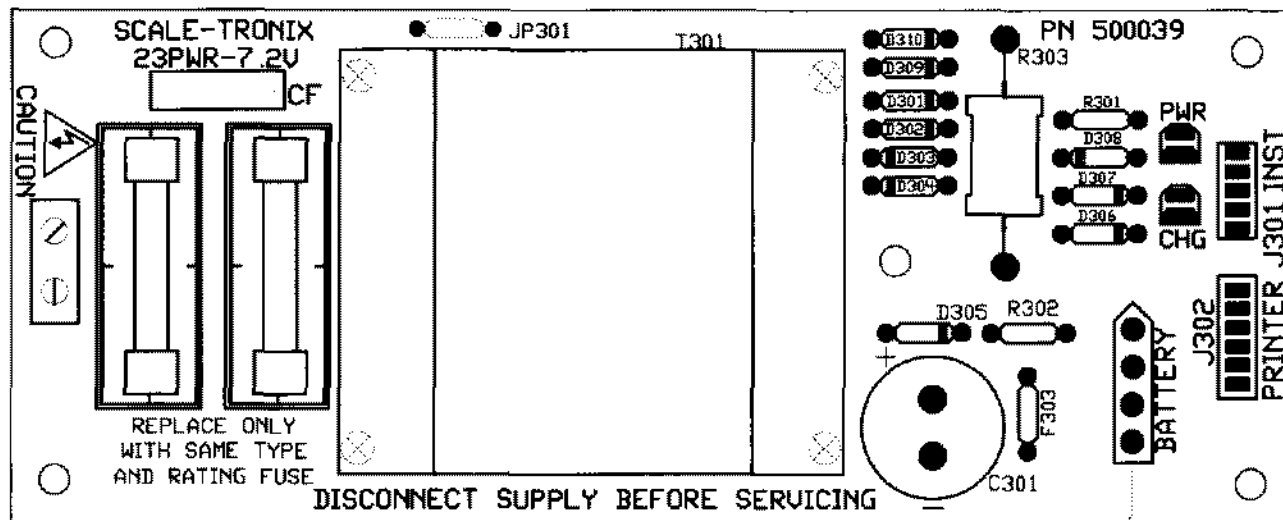


#700049 INSTRUMENT BOARD FOR 5002/6002/6502/6702/ETC.  
 #700051 INSTRUMENT BOARD FOR 6102

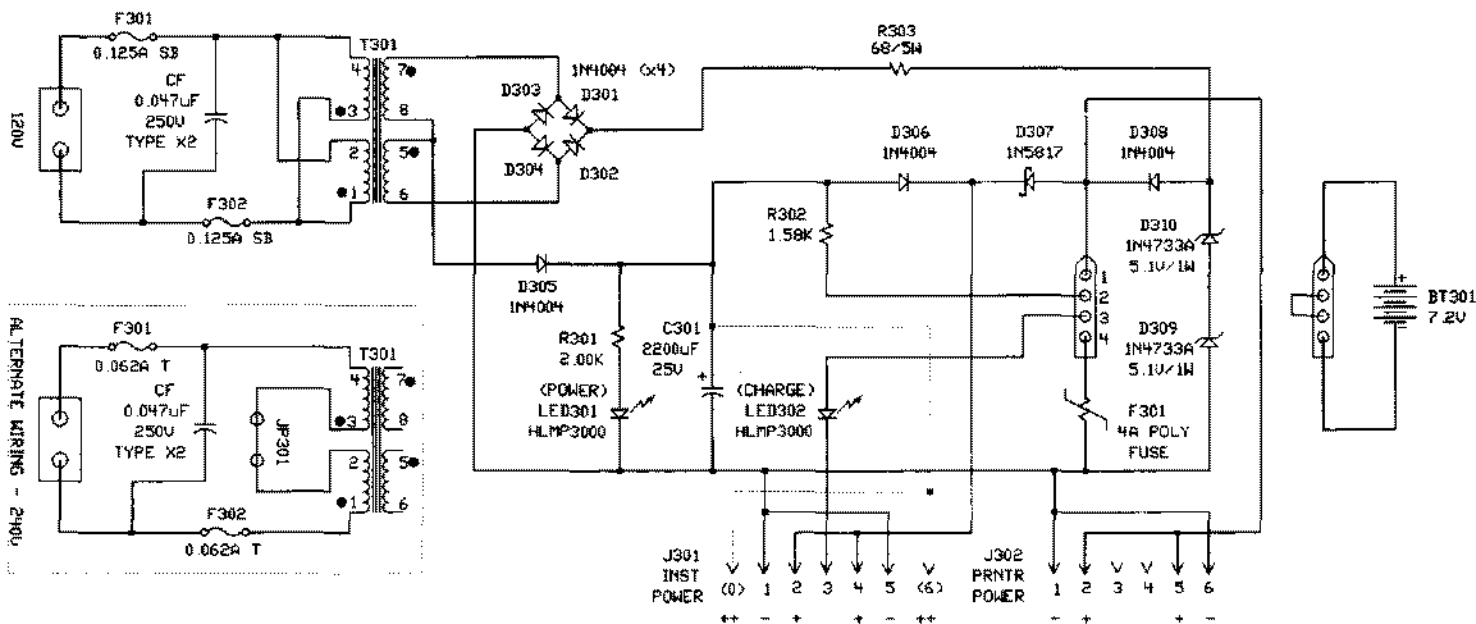
Note: Some annunciator lamps may be omitted depending on scale model & option.



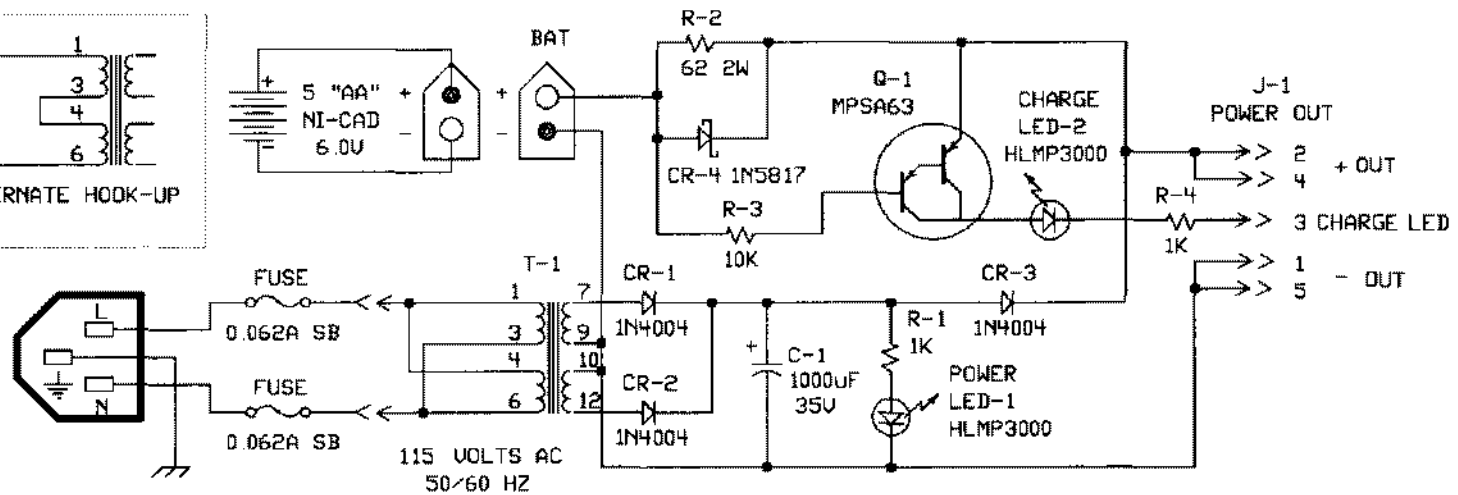
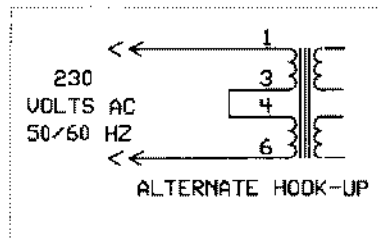
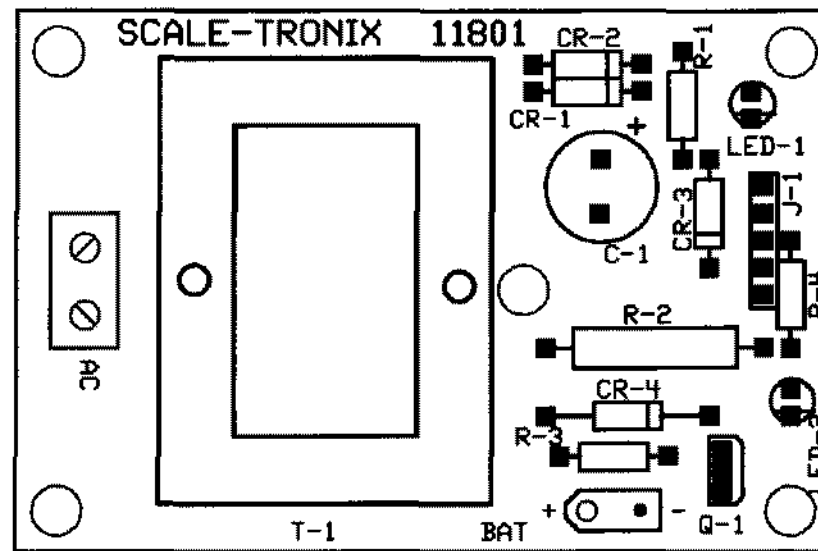
#700027 TYPE 22DSDP DISPLAY BOARD  
(22DSDPR03 SHOWN, 22DSDPR01 & 22DSDPR02 SIMILAR)



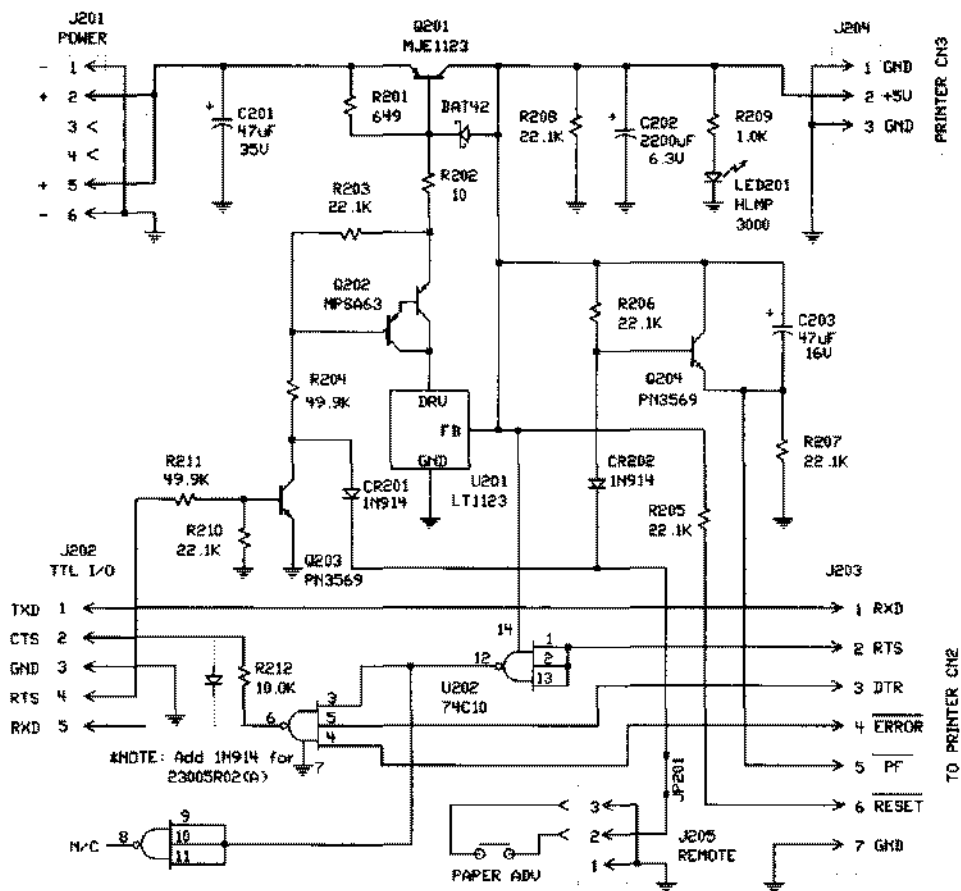
(NOTE: #700004 HAS OFF-BOARD BATTERY CONNECTOR)



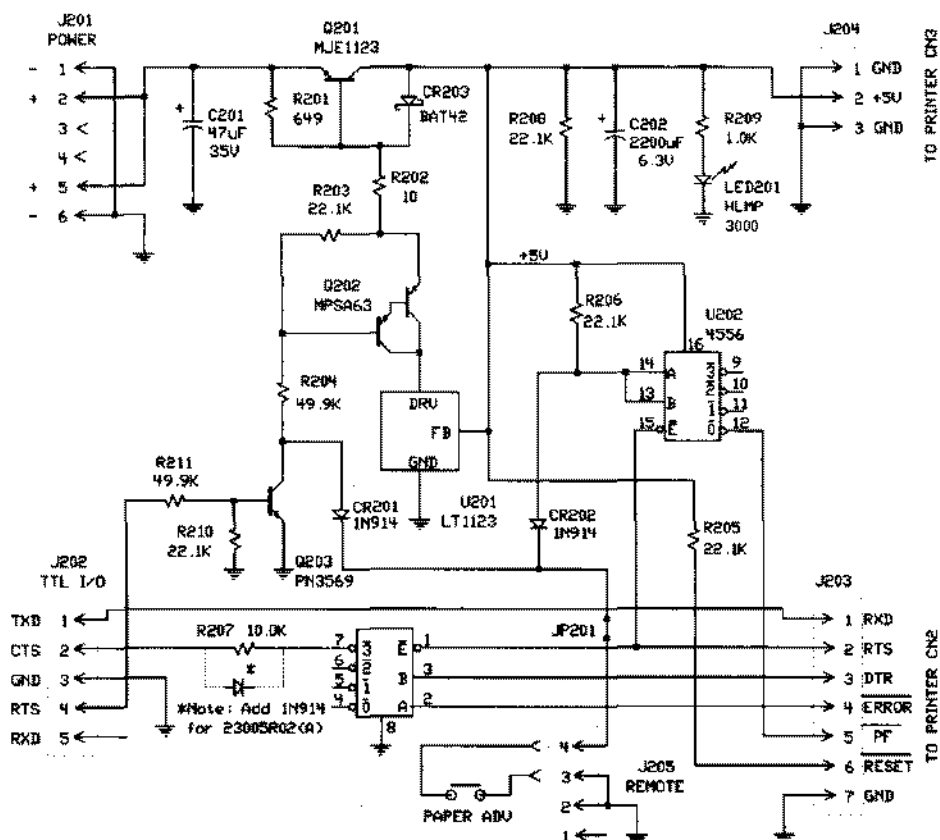
#700004/700101 TYPE 23PWR7 POWER SUPPLY AND 7.2V CHARGER



700018 TYPE 11801 POWER SUPPLY AND 6.0V CHARGER



## 23PRTR02 PRINTER CONTROLLER



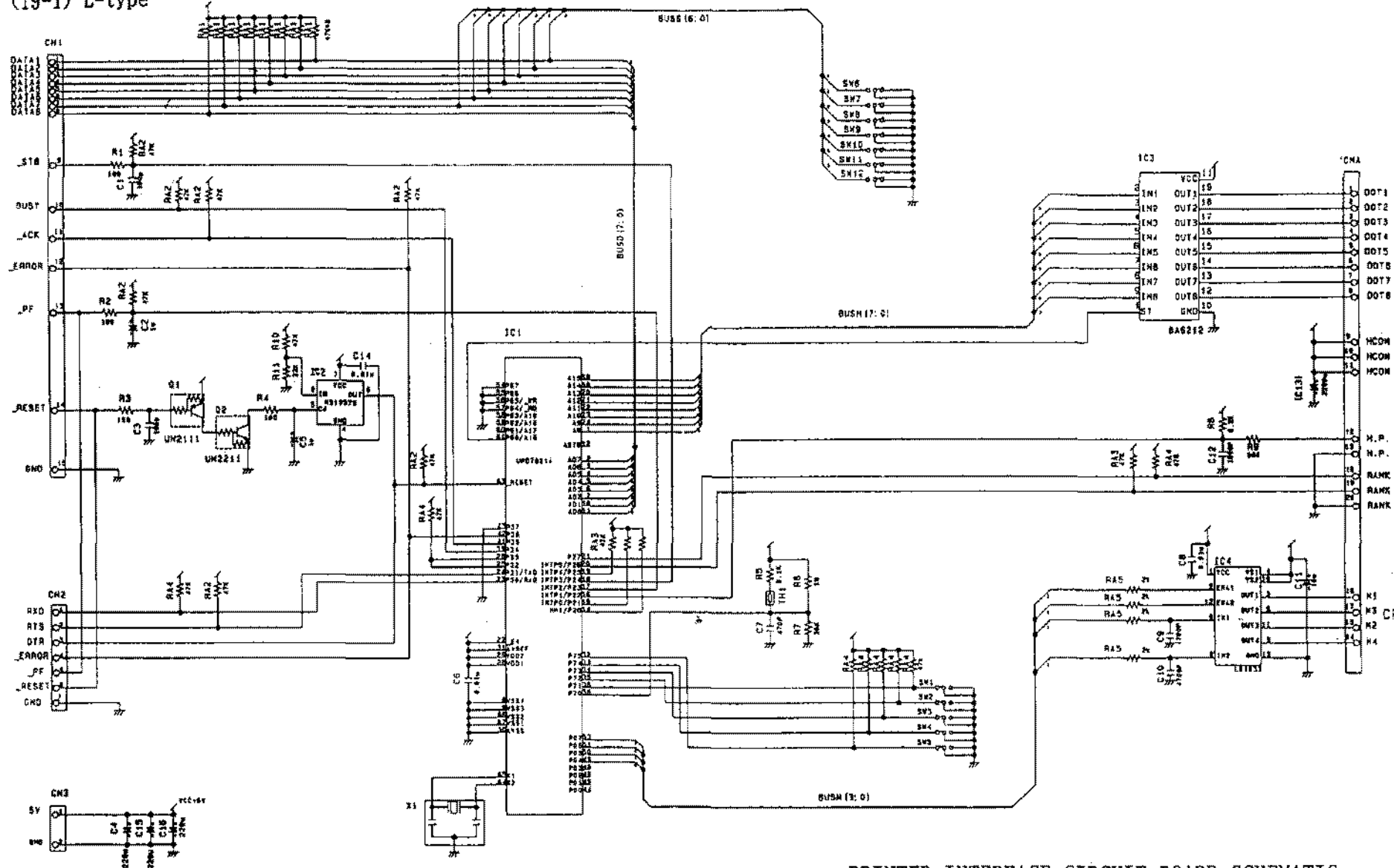
## 23PRTR03/23PRTR04 PRINTER CONTROLLER

07/10/1997  
file: 23prtMAN.sch

#700052 TYPE 23PRT PRINTER CONTROLLER  
WITH OFF-BOARD PAPER ADVANCE SWITCH



# (19-1) L-type



PRINTER INTERFACE CIRCUIT BOARD SCHEMATIC

# WARRANTY

## 6.00 WARRANTY

THE MANUFACTURER warrants all scales to be free from defects in parts and workmanship. Its obligation under this warranty is limited to repairing or replacing an improperly operating unit, providing the scale has been under normal usage and service.

**The following terms and conditions apply:**

1. The warranty period is for one year starting on the date of shipment to the purchaser.
2. The warranty covers parts and factory labor to repair the scale, except where parts failure is caused from abuse or misuse of the scale, or load sensors.
3. Notice of the alleged defect must be given during the warranty period and must state the model number, serial number, date of purchase, and installation date. The scale or portion thereof is to be shipped prepaid back to the factory.  
**The customer must first contact the factory for return authorization number and receive proper packing/shipping instructions and shipping address.** The seller accepts no responsibility for loss or damage to any product or part in transit, nor will any claim be honored unless the product or part is received intact with no evidence of previous attempts at repair.
4. The seller's sole obligation under this warranty shall be, at its option, to repair, replace or refund the purchase price of the equipment.
5. The obligations of the manufacturer under this warranty does not include responsibility for any transportation expense of equipment or field labor or expenses that may be requested by the purchaser in lieu of returning the scale to the factory.
6. The seller shall not be responsible for:
  - (a) consequential, collateral, or special losses or damages.
  - (b) defects caused by fair wear and tear, abnormal conditions of use, accident, neglect or misuse.
  - (c) improper operating, maintenance, or repair.
  - (d) batteries.
7. This warranty and any obligation of liability shall cease and terminate immediately if:
  - (a) any unauthorized modification, alteration, or substitution of any part or parts of the product is made; or
  - (b) the serial number of the product is altered or defaced.
8. No employee or agent of the seller has any authority to add to, subtract from, or change any portion of this warranty and the seller's obligation is limited strictly to these terms as written and defined by the seller.
9. This warranty is the sole warranty of the seller and any other warranties expressed, or implied in fact, are hereby specifically excluded.